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ABSTRACT

Conference papers and descriptions of panels, workshops, and poster sessions are separated by topic into five "stems." The first stem, Advanced Technology Applications, contains papers covering advanced technology training, evaluation and applications of word processing equipment, publication databases, electronic and online documentation, and documentation systems. The Management and Professional Development stem includes papers concerned with such issues as hiring and appraising writers, audience feedback and analysis, and managing resources. The Research, Education and Training stem addresses recent technical communication research, technical communication education, and the future of research and education in technical communication. Under the Visual Communication stem, the 18 sessions represented offer different perspectives on topics ranging from digitized typography to video programs; these papers describe both new technology and new approaches to established visual communication techniques. The Writing and Editing stem includes descriptions of 204 sessions addressing the problem and promise of automation in technical communications: and discussing product design, task analysis, graphics techniques in text, document testing, online documentation, technical writing styles, online editing, a systematic approach to copy writing, and documenting poorly designed systems. Author and subject indexes are provided. (LMM)

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PROCEEDINGS

31st International Technical Communication Conference

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A Message from the General Managers

James W. Souther
Myron L. White
General Managers

A major conference like the ITCC doesn't just happen. It is created through the efforts of a great many people: the speakers and program participants, the people who planned the program and the conference, the endless committees, the staff of the national office, the STC officers of the local host chapter. To all of these, we offer our congratulations. The 31st ITCC will stand among the best, and these *Proceedings* provide that lasting and useful record.

So, now, enjoy Seattle and the 31st ITCC. It's your conference; make the most of it.

A Message from the Program Manager

Renee K. Barnow
Program Manager

The *Proceedings* contains the papers and descriptions of panels, workshops, and poster sessions of material presented at the second three-day conference sponsored by the Society for Technical Communication. The *Proceedings* is a valuable document. In our work most of us face questions to which we don't always know the answer. The value of the *Proceedings* is that it often contains the answers to our questions. By treating the *Proceedings* as a reference document, we can share the knowledge it contains. As technical communicators we have a responsibility to continue to learn about our field and to educate others. The participants in this year's conference have helped to make the educational opportunities possible.

The quality of the sessions at the 1984 International Technical Communication Conference (ITCC) is the result of the hard work and wisdom of the participants, the Program Committee, and the committee's staff, the stem managers: Cal Callahan, William Davis, Jorome Gibbon, JoAnn Hakos, and Jan Robbins.

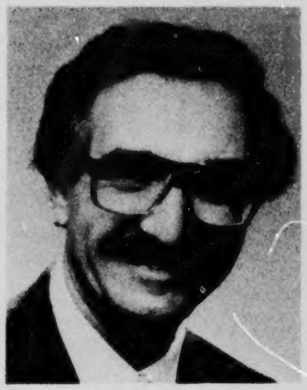
The program was designed to present the latest information on technical communication, to foster interchanges of practices in our workplaces, to provide opportunities to learn detailed and sometimes complex concepts in technical communication and, most important, to 'sound the future' in the areas of advanced technology applications; management and professional development; research, education, and training; visual communication; and writing and editing. The stem managers were intent on offering quality sessions that provided information and techniques we as technical communicators can use to improve our performance. The *Proceedings* is a testament to their success.

The success of the program is due also to Penelope Grenoble, my deputy. Penny contributed to the conference in many ways. Before she was appointed Assistant to the President for Recognitions, Penny was the Program Committee's unofficial 'liaison' for recognitions. Many of the changes in the awards programs reflect Penny's efforts. Since January 1982, when the 31st ITCC was a gleam in my eye, Penny has been there. She has been a superb colleague, listener, reviewer, advisor, and friend.

The same unflagging support was given by M. Lou Doyle, Program Liaison. Lou was always available to communicate our sometimes confused thoughts to the Planning Committee and to add a sense of order and humor to our work. The Program Committee's plans could not have been executed without Lou nor without the cooperation and needling of the entire Puget Sound Chapter's Planning Committee. Through several meetings and many phone calls, the efforts of the two committees merged.

In sum, the 31st ITCC and the *Proceedings* are the products of a team effort. Many papers in the *Proceedings* provide tools that are applicable in several areas, although they may be presented in one stem. To that end, I encourage you to browse through the entire *Proceedings*. I think you will agree that the stem managers built a program of lasting educational value. My hope is that this document will be used so often that it will become dog-eared.

A Message from the President



Ernest Mazzatenta
STC President

Read…Enjoy…Learn!

You now are examining a book that is, truly, one of a kind.

In no other single volume can you find papers dealing with so many contemporary issues, problems, and challenges in technical communication. Nowhere else can you locate such an impressive array of contributors from the world of technical communication: graphic artists, audiovisual specialists, researchers, teachers, translators, librarians, writers, editors. And in no other place can you unearth so many practical suggestions, so many 'how to do it' accounts which are based on real-life 'success stories.'

Rather than go on, however, let me allow the *Proceedings* to speak for itself. Peruse and enjoy it today. Go back to it frequently. You will find it pushing you toward excellence.

Acknowledgment

A great many people contributed to the creation of the *Proceedings* of the 31st ITCC, not the least of whom are the authors who prepared the camera-ready copy from which their papers were printed. I would like to express my sincere thanks to those authors, whose professionalism is evidenced not only by the content of their papers, but by their willingness to subordinate what may have been their own personal format preferences in favor of the guidelines authored by the proceedings committee. The resulting consistency in style, we hope, will allow the *Proceedings* to convey visually a sense of the professionalism of the members of the Society it represents.

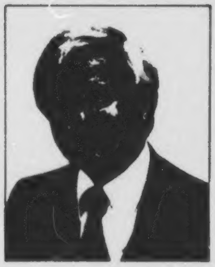
As proceedings committee chairman, I have indeed been fortunate in having had a committee whose members assumed responsibility not just for tasks, but who relieved me of the need to provide direction to their activities. It is seldom in my experience that I have had the opportunity to sit back and watch a group of volunteers so willingly divide among themselves the responsibilities for parts of a project and so competently fulfill them. My thanks to committee members Brian Ahola, John Browne, Richard Oberg, Judy Ramey, and Frank Sanger.

Finally, I would like to extend my thanks to Glen Beebe, who designed the *Proceedings*; to Myron White, who coordinated our efforts with those of the program committee; to Ted Hastings, who coordinated the printing; and to Russel Hirst, who volunteered time to proofread paper titles and authors' names.

Thomas R. Williams
Proceedings Committee Manager

Advanced Technology Applications Stem

Jorome T. Gibbon, Stem Manager



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Jorome Gibbon, Manager of the Engineering Documentation Department at the Pulsecom Division for 12 years, joined the STC in 1968 and is a senior member. Mr. Gibbon has been involved with technical communications for 20 years, having worked in industry as an electronics technician, engineer, and engineering writer prior to his assignment as manager in engineering documentation. He has published several articles on engineering writing and engineers as professional communicators.

As manager of engineering documentation Mr. Gibbon has been instrumental in defining, developing, and implementing an information and document processing system. The system is used for generating and publishing product documents for telecommunication equipment.

Mr. Gibbon has received several awards from the STC for outstanding technical documents in the Newsletter, Instruction Manual, and Sales Catalog publication categories.

In the STC Washington, D.C. Chapter, Mr. Gibbon has served as Seminar/Workshop chairmen (1981), Vice President and Program Manager (1982), and is currently the Chapter President (1983-84). At the 1982 and 1983 ITCCs, he presented papers in the ATA Stem on engineering documentation and served as session moderator.

Mr. Gibbon has been a member of the Advisory Board on Engineering Education at the Capitol Institute of Technology since 1978, and has served as speaker and program manager on several professional development seminars. In addition he is a member of the American Management Association, and the Institute of Electronic and Electrical Engineers. Mr. Gibbon received his bachelor of science degree in electronics engineering from Capitol Institute of Technology.

RESPONSIBILITIES

Today technical communicators have the continued responsibilities to help people now and in the future to preserve the languages they have learned and pass on new information they have generated. The significant aspects of this information passage is that technology will continue to grow and change making languages more difficult to translate and be understood by new generations.

ADVANCED TECHNOLOGY

Technical Communicators have a large task before them; however, thanks to advances in computing equipment and software, these tasks are becoming more manageable. Word, text, and graphic processing equipment has revolutionized the office and all forms of the information business. Technology is providing more efficient methods for technical communicators to generate, revise and distribute documented information, saving both time and energy, while providing a higher degree of technical accuracy.

MESSAGE

The Advanced Technology Application (ATA) stem includes many papers which carry the important message home. The message is that technology provides man with both the problems and the solutions for the communication of technical information.

CONTENTS

This ATA program for the 31st ITCC is organized around a strong base of technical information sessions. These sessions strike at the very heart of automated document and information processing. Papers given in these sessions cover advance technology training, evaluation and applications of word processing equipment. Several papers give you the opportunity to explore publication data bases, electronic and on-line documentation, as well as documentation systems, such as the DOC SYS 6670. The experts have contributed their best to give you a close look at computers that perform document control, graphic support, and integrated publications, as well as, equipment advances with the newest technology. From all these papers you will learn how your job will soon be expanding. Also you will get a good look at what users of information handling equipment are doing today and will be doing tomorrow.

The Communicator and the Survival of Technology

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ABSTRACT

Technology does not last forever but is dependent on the survivability of records and the literacy and sophistication of future audiences. Our records, however, are moving away from archival copies and are vulnerable to loss. What can be done to preserve technology for future generations? Responsibility lies with technical communicators.

THE COMMUNICATOR AND THE SURVIVAL OF TECHNOLOGY

Technical communicators who attend a Jewish Torah service should be struck by the significance of a special symbolic moment. Before the Torah scroll is returned to the ark it is held up so everyone in the congregation can see the written parchment for themselves. Most people know that the Torah contains the first five books of the Bible, but most are unaware that it begins with one of the oldest existing descriptions of a process: how the world was made, Genesis, chapter 1. It also has some of the oldest existing instructions, the preparation of a burnt offering, Leviticus, chapter 1, and specifications for the Arc of the Covenant. This is historical technical writing, and it still exists in a world where other technologies have come and gone.

The Torah has survived because the written word was considered holy, and the literacy of the people chosen to guard and preserve the Word has contributed to the survival of their culture through the rise and fall of many nations and technologies. If our own technology and culture are to survive it is our responsibility as technical communicators to make sure that our records are as durable and readable as the ancient documents of the Jews.

Make no mistake. Technology is not guaranteed to survive. Many technologies have come and been lost. Others are now only being rediscovered. Here are some examples:

The Rediscovery of Navigation

Marvin Creamer set out on December 22, 1982 to sail around the world. In these days of satellite navigation, LORAN, radar, nautical charts, and a highly developed technology, sailing a boat around the world is no longer remarkable. Surprise: Marvin Creamer is doing it totally without instruments. What Marvin Creamer is doing has a bearing on our own attitude toward science and technology. You see, what Marvin Creamer is doing is not entirely original. He is trying to prove that he has rediscovered it.

The polynesians who settled Hawaii roamed the Pacific in open canoes without instruments, without compasses, without elaborate nautical charts. How they did it was only recently written down by David Lewis in We, the Navigators: The Ancient Art of Landfinding in the Pacific. He did it just in time, for only one Polynesian still remembered how. There was no written word for a Polynesian primer of navigation.

The art of navigation without instruments had been lost at least three times before. The Phoenicians knew it first. They voyaged in open boats against the strong Atlantic current flowing in through the Straits of Gibralter, up the coasts of Spain, Portugal, and France as far as Britain. They also sailed the coast of Africa and may have made it to the Indian Ocean. In America B.C., Ancient Settlers in the New World Barry Fell speculates that they colonized North America. But besides being fine navigators, the Phoenicians were secretive, jealously guarding the skills that made their voyages possible. They had a written language but left no written instructions on the art of navigation. It had to be rediscovered.

The Vikings also navigated the North Atlantic in open boats to Vinland and established a colony. But wars intervened and the navigational skills died with the men who possessed them. The Vikings left behind wonderful literature in the form of sagas, and stone grave markers with carved runes describing the lives of the dead. Stone markers are durable, but Viking Runes were not suitable for treatises on the art of navigation.

Modern men have tried to recreate legendary voyages using long lost technologies. Tim Severin proved that it was possible to cross the Atlantic in a leather boat (read his *Brendan Voyage* and Jean Fritz's *Brendan the Navigator.*) The Norwegian Thor Heyderdahl built Kon-Tiki of balsa logs, and RA of bundled reeds. He did cross oceans, as described in *Kon-Tiki* and *The RA Expeditions.* The lost arts were rediscovered.

Rediscovery of Trickle Irrigation

Forty-five years ago a Palistinian tree growing beside a leaky water faucet led to the discovery of the trickle method of irrigation, said to double productivity with half the water. Now it turns out that the technology existed two thousand years ago and was used for the Hanging Gardens of Babylon. It had been rediscovered by accident.

The Rediscovery of Concrete

When the Roman empire crashed in the fourth century and Europe entered the so-called dark ages, the engineering skills of the Romans were also lost. It took until the 20th century to rediscover their secrets of concrete. Bridges built in Roman times for chariots are still standing today, carrying semi-trucks and loaded city buses. Roman technology was lost for nearly sixteen hundred years. Will the same thing happen to our technology?

Deliberate Eradication of Knowledge

Technology does not have to be lost by accident, or through the unfortunate death of the last Polynesian who knows the secret. Sometimes the death of science and technology is the consequence of deliberate destructive acts. The most famous library of the ancient world, the Greek library at Alexandria, is believed to have held over half a million volumes. It existed for over 400 years, but it was destroyed in a civil war in the third century AD. The so-called "daughter library" was destroyed by the Christians in 391 AD. Carl Sagon estimates that the loss of the library at Alexandria set technology back a thousand years.

In Roman times a library of 50,000 manuscripts was considered enormous-- yet that's only a tenth of what was lost at Alexandria! In the Middle Ages, a library of a few hundred hand copied books was a treasure. Yet today a university library with less than a million volumes is clearly second rate.

The written word is dangerous and has been the historic target of conquerors. When the Spanish conquered the New World in the name of the Church, the Spaniards set about to obliderate all traces of the pagan societies they conquered. All written records were destroyed, and today historians have only fragments of what were once great civilizations.

Adolf Hitler's fanatic crusade against the Jews burned books and people. He succeeded, with the willing cooperation of the anti-semitic Poles and Russians, in destroying most of the mystic culture of Eastern European Jews. More recently, the Cambodian communists set out to create an agrarian state, to purge their country of modernity. Those with college degrees, educated professionals, doctors, lawyers and teachers were executed. Technologies and cultures disappear.

Sometimes they are lost forever. Sometimes by a stroke of luck, a link to the past can be rediscovered. In Egypt in 1799 a soldier found the Rosetta stone, a mysterious black stone bearing parallel records in three languages. Even so, it took twenty years to decipher this key to the lost language of hieroglyphics.

What About the Future?

There is no reason to assume this will not happen again. It is easy to draw up a scenario of nuclear holocaust followed by an occupation by people who deliberately wipe out all educated professionals, including technical communicators. If the new language is not suitable for the communication of technical information-- a handicap well known by technical translators-- what then?

There is a new trend toward doing away with documents that can be read with naked eyes. For a long time companies have converted plans, drawings, and records to microfilm and microfiche. Libraries have become interlocked and dependent on each other because no one library can afford to subscribe to all technical journals. We rely more and more on electronic networking of interconnected databases, with information on magnetic disks. Scientific journals are moving toward electronic publishing. Will this become a world without hard copies? Is anything archival?

Some Solutions

First, we need our own Rosetta stones. What if that Napoleonic soldier had found, instead of a durable stone, a filthy floppy disk or a corroded electronic watch? It would be impossible to read the disk or recreate the chip in the electronic watch. The electronic communications network is fine as long as the grid doesn't go down, as it surely will in a nuclear holocaust. The network will go down with it. Will our technology follow?

Let us keep hard copies. Let us not be dependent on a single language for the survival of technology. The Spanish treated the Inca and Aztec languages as taboo. Today in the Soviet Union it is illegal to teach Hebrew, the language of the Torah. Where would technology be if English were an illegal language? Would the computer have to be rediscovered? Will the Salk vaccine be lost forever? Have you a copy?

Need for Literate People

Second, we need people who are technologically literate. The recent report that 13% of 17 year olds and 17% of the adult population are functionally illiterate shook the United States. Worse, 40% of Hispanic Americans are functionally illiterate. In a world where knowledge is increasing exponentially, everyone has a responsibility to learn as much as possible if the technology is to survive. Technological knowledge must be distributed as equally as material goods, or the mass will be dependent on a thin layer of elite technicians and scientists as vulnerable as those in Cambodia.

Our Role as Communicators

As technical communicators we play a pivotal role, acting as translators of that massive technology for a world full of people, people who have limited educations, different cultures, and languages that may not, like the Phoenicians, the Vikings, and the Polynesians, adapt well to the communication of technological information. We must make sure that the next generation is educated to take our places. We must make sure that the copies are not only durable and readable, but cared for. That Torah held up for the congregation is on parchment, not stone or magnetic disks. Its survival for thousands of years is a miracle made possible because the people chosen as caretakers preserved it. In a society where the miracle of the electronic chip is a throwaway $3.00 watch, can technology survive? It's up to us.

Choosing, Learning, and Using a Text Processing System

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This panel helps both beginning and experienced users explore the options available when choosing, learning, and using a text processing system.

The first paper covers evaluating and choosing a system to meet a writing group's needs. Next, the second paper examines how to train new users and keep current users informed about their system. The third paper examines the communicating functions (electronic mail) available for writers and developers.

As you will see, the theme of appropriate communication runs through all three papers.

Virginia Woolf once compared the then newborn film industry to a piano washed up on the beach of a primitive island: capable of making great music, but not immediately comprehensible to the natives who find it. Sometimes I think that those of us in the technical writing field are in the same situation as the natives in Woolf's simile. There is this fascinating "box" sitting in front of us, but we have not yet developed the skills to produce great music. The "box" is, of course, our computer terminal.

My frustration over this situation has begun to lessen as I see more and more technical writers developing new skills with text processing. The three speakers in this panel represent the new generation of computer-trained technical writers. They have all investigated and exploited the computer's capabilities as a writing tool. They have also shared this information with other writers. Their papers represent such learning and sharing.

SELECTING

Selecting a system, as the first paper explains, involves choosing options. A personal computer for each writer or a central system is just the first choice to make. Dave Cornell has distilled several years of experience and problem solving into a clear, useful checklist for the writer about to switch from typewriter to text processor. *Considerations for Selecting a Word Processing System* emphasizes the need to find out what writers want, that is, communicate with your staff, before choosing a system.

TRAINING

In the second paper, Larry Kunz shares ideas about training writers to use their text processing system. *Teaching Not-So-Technical Writers about Computer Tools* emphasizes the need to go beyond that first day's orientation and reading of the manual. As he points out, to be most effective training must be a continuing process. Writers need to communicate with each other regularly about newly discovered options, changes, and clever shortcuts.

COMMUNICATING

Finally, Shelly Dews points out in *Tube Talk: Communicating by Computer* that writers may not only communicate about their system but also by means of it. Her ideas on documenting correspondence between technical contacts or product developers and writers or information developers are pertinent. Such an approach demonstrates how writers can develop new skills and create great music with their "boxes."

So I invite you to explore the potential of text processing with these speakers.

Considerations for Selecting a Word Processing System

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Thinking about switching to a word processing system? If you are, you may find yourself wondering how you can get exactly the system you need. This paper provides a list of things that you should consider when selecting a word processing system. The topics covered include:

- *What Kind of System Should I Get?*
  - *General Computer System Or Dedicated Word Processor?*
  - *Personal Computer Or Central System?*
  - *Reliability*
  - *Check Out the Display*
  - *Check Out the Keyboard*
  - *Getting the System When You Need It*
  - *Response Time*
- *What Do I Do After I Get It?*
  - *System Education*
  - *System Documentation*
  - *System Changes*
  - *Access to the System*
  - *Space and Lighting Considerations*
  - *Protecting Your Information*
- *Selecting a Text Editing System*
  - *Basic Types of Text Editing Systems*
  - *What Should a Text Editor Do?*
  - *Preparing the Rest of the Book*
  - *Formatting and Printing Documents*
  - *Distributing Drafts*
  - *Evaluating Drafts*

I have been using computer systems for technical writing about seven years. In that time I have been exposed to several different types of word processing systems. I have summarized in this paper the things you should think about when considering the use of a word processing system for the first time.

WHAT KIND OF SYSTEM SHOULD I GET?

Word processing systems are not all alike. In addition to the differences between the systems made by different manufacturers, there are differences of design philosophy.

General Computer System Or Dedicated Word Processor?

You must decide whether you will get a general purpose computer system and add text processing programs and hardware to it or whether you will buy a system especially designed for word processing.

The advantage of using a general purpose machine is that you can also use it for other things, such as accounting, billing, engineering, programming, or business planning.

The advantage of using a dedicated word processor is that you do not have to pay for a lot of extra functions that you do not need. The functions you do get are specifically designed for word processing, so you do not need to figure out how to modify general purpose functions to make them suitable for writing. Also, you do not have to have writers competing with programmers, engineers, accountants, and planners for computer time.

Personal Computer Or Central System?

You must decide whether each writer will have a separate personal computer or all the writers will share a centralized system. If you pick a central system, you also need to decide whether the writers will share the system with non-writing areas.

The advantages of using personal computers are:

- Each writer can have customized equipment and programs for a particular job: graphics, editing, data entry, and so on.
- Personal computers do not require a staff of professional programmers to operate them. Aside from reducing personnel costs, this also gives the writers more control over the computers. Because a personal computer is operated by the writer, the writer can come in on weekends or at night to work without worrying about whether the central system is operating.
- Each user does not have to compete with other users for system resources. Whoever is using a personal computer has full control of its resources. For example, one writer does not have to wait for another writer's print job to complete before using the printer. Also, the response time is uniform because only one person is using the system at a time.
- Personal computers can be acquired one at a time, allowing gradual growth. For example, you could buy one personal computer as an experiment, without making the large investment that a central system might require. After evaluating the first personal computer, you could get more if desired.

- If a personal computer breaks down, only one writer is affected, not the entire department.

The advantages of using a central computer system are:

- A central system will have more processing power and memory than most personal computers. It can therefore handle complex applications that a personal computer cannot.

- A central system can be monitored to prevent unauthorized use of the system. This could give you better security and control over the system.

- In a central system, printers, disk files, and other resources can be shared by many users. This sharing of resources may mean that the cost per user is reduced. Therefore, for a large number of users, the total cost may be considerably lower than if each user had a personal computer.

- It is easier to send messages and files from user to user in a centralized system. This may be important if you have teams of writers working together on a large library of manuals.

Reliability

One of the more important considerations is the reliability of the system. All your manuals are stored inside the system. If the system should break down, you may find yourself in the traumatic situation of not being able to get at your manuals for a while. Also, once you have used an automated text processing system, you tend to become dependent on it. The prospect of going back to a typewriter or paper and pencil is rather unattractive to someone used to good word processing equipment.

Check Out the Display

An important part of any text processing system is the video display monitor. You will spend several hours a day reading text off it, so you want to get one that will not strain your eyes. Some text editing systems can use an ordinary television set, but the characters they form may be too fuzzy to look at for long. Look at all the monitors available for the system you want to buy. Check the character it produces for size, sharpness, color, and brightness. If you need special symbols or want to do graphics on the display, make sure the display can show them.

Check Out the Keyboard

Depending on what you are already used to, you may find the keyboards of many systems to be a trial. Unlike typewriters, computers do not have a real standard for keyboards. They vary from company to company, from model to model.

Try out the "feel" of the keyboard. Is touch-typing comfortable? Do you get many double characters from "keyboard bounce"? Does the keyboard offer function keys? Again, if you need to use special characters, make sure that the keyboard has them.

In addition, in some systems, certain keys can cause severe problems if accidentally pressed. For example, in some systems, pressing the RESET key causes the current program to be ended abruptly with a loss of whatever data is being processed. You may be able to find out about such keys from someone who already has the system you are considering. You may also request a chance for a "test drive" before you buy the system. You can then run a typical program and methodically press every key on the keyboard and see what happens.

Getting the System When You Need It

Buying and installing a text processing system, and then getting comfortable with it, takes time. If you know that you have a big project due in July, do not expect to put your new system in place in June. Just learning to use the system will absorb a lot of your time and energy.

Also, if you order a very popular system, you may have to wait awhile for your order to arrive. Depending on the system and the vendor, the wait may be anywhere from a few days to several months.

Response Time

Another important consideration in selecting a text processing system is the response time of the system. Response time is how long you have to wait for the system to do whatever you told it to do.

Some text processing systems are frustratingly slow. If you use the system for text entry and editing, slow response time greatly reduces the amount of work that you can get done each day. It also tends to reduce your incentive to use the system.

Slow response time can be a problem on a central system during peak times when everybody tries to use it at once. In addition, some processes, such as compiling large programs, can use up a large part of a systems resources. One programmer compiling a program can slow down the system for all the other users.

Slow response time on a personal computer usually means that the computer is being asked to do more than it was designed for. A very large and sophisticated word processing program may overwhelm a small personal computer.

Response time also depends on where your data is stored. If your data is stored on a cassette tape, it will take longer to get the data than if it were stored on a disk system, which operates more quickly. Similarly a hard disk is faster than a floppy disk.

WHAT DO I DO AFTER I GET IT?

After you have selected a word processing system, you will need to consider a few more things to get the most effective use out of it. These considerations include system education, system documentation, system changes, access to the system, and space and lighting in the work space.

System Education

Writers should be trained to use all automated systems. Depending on how complex the system is, this could require anything from a few hours of on-the-job training to several months of formal classes.

System Documentation

Adequate documentation should be available for all parts of the system. If you buy your text processing system from a software vendor, you will almost always receive a set of manuals with the system. The quality and completeness of manuals are quite variable, so you may want to check out the manuals before you buy.

Even the best of manuals cannot cover every case, so you will need additional material. More than likely you will have to write some of it yourself.

System Changes

After you have had a computer system for a while, you will eventually want to make changes to it. (Indeed, you may be forced to make changes.) These changes, however, may disrupt the users of the system. Since no one likes to be disrupted, especially when trying to get work done, users tend to be rather leery of changes. This is particularly true with central systems, where the changes are not made by the users themselves, but by the programming staff.

One way to reduce this problem is to try to get programs that are "downward-compatible." All this means is that any new versions of the program are guaranteed to work with any files, programs, or equipment that the old versions worked with. Another thing you can do is to carefully schedule your changes so they occur during off-hours when the system is not needed.

Ideally, any changes to the system, whether it is a new level of a program or a new printer, should be transparent to the user. That is, it should never be necessary to recode a correctly coded file to make it work with a new level of a word processor.

Access to the System

When I started in technical writing, if I wanted to work late or come in on weekends, it was just between me and my typewriter. Now, I have a new consideration: Is the system up? Because a centralized system requires a staff of computer operators to run it, there may be times when the system is unavailable because there is no one to run it. If you have this type of system, you should be sure that there is proper coordination between your writing department and your computer staff to ensure that the system is there when it is needed.

One way around this problem is to give all writers a personal computer and train them to operate the computers themselves.

Space and Lighting Considerations

Installing and using a word processing system requires more space than you might think. Make sure that each writer's desk or work area has enough space to hold the display and its keyboard. A personal computer may also have disk drives and a printer. (This is besides the telephone, cup of coffee, and other stuff that clutters every desk.) Also remember that the writer will need to have papers and manuals nearby when using the system. (I have sometimes had to work with papers on my knee or on the floor beside me. This is no fun at all.)

There is special computer furniture available that is designed to hold all this stuff. If you plan to go into word processing in a big way, you should look into getting some of this furniture.

When you are using a video display, you must also consider the lighting of the room. Generally speaking, you need less light when working with a display. Bright light glaring on the screen can cause eye strain. If there are windows in the room, you may need to install window shades or blinds.

You may also have to consider cable requirements. Most computer systems are connected with a snakes-nest of cables, power cords, and telephone lines. Look at where the telephone jacks and power outlets are in your work space. You may want to add extra jacks and outlets to reduce the number of extension cords you need.

Protecting Your Information

Information stored in a computer or on a disk can disappear much more rapidly and with much greater finality than information written on paper. The memory of a computer can be erased by a power failure; a diskette can be ruined by a paper clip. To avoid loosing valuable information, you should carefully review all the warning statements put out by the manufacturers of the equipment and diskettes you use. Make sure that each writer is aware of these warnings. You should also ensure that you have extra copies of all important data and documents.

After you have started writing your books on a computer system, you will begin to collect disk files containing various documents. You should have a means of safely storing and retrieving your files.

SELECTING A TEXT EDITING SYSTEM

Besides picking out the hardware of your system, you must also pick out the software to go with it. Just as even the best stereo system will sound bad if you play poor quality records on it, even the best computer system will perform poorly if you run poor quality programs on it.

Basic Types of Text Editing Systems

There are two basic types of text editing systems. The difference has to do with when the document is formatted:

- Immediate formatting.

This type of system is sometimes called a "What You See Is What You Get" (WYSIWYG) system. (The acronym WYSIWYG is pronounced "whizzy-wig".) As the name implies, the system shows you on the screen more or less what will be printed on the printer. That is, all headings, margins, page numbers, and so on can be seen on the video display.

All the formatting of the text is done as soon as the command is given. For example, if you give a command to put the document into boldface type, the characters on the display will be highlighted to indicate bold type.

The advantages of this system is that it produces immediate results for every formatting command. The writer can see what the draft will look like without printing it. The disadvantage is that your display may not be able to show you everything that your printer can print. For example, it may not be able to show you large type or italics. This may limit the kinds of formatting you can do.

- Separate formatting.

  With some systems, the writer types command codes into the text to indicate where to indent, where to use italics, and so on. The document shown on the screen is unformatted.

  After the document is written and all the commands are inserted, the document is processed by a formatting program that produces a separate, formatted document according to the commands in the original file.

  The advantages of this system is that the formatting you can do is not limited by the capability of your text entry system. That is, you can specify formatting features in your text that your system could not possibly display on the screen. Also, because the formatting is done separately, the text editing part goes faster because you do not have to wait for the document to be reformatted after every editing command. Another advantage is that you can tell the formatting program to format the document different ways for different printers.

  The main disadvantage is that you do not know what a document will look like until you format it and print it.

What Should a Text Editor Do?

Most text editing programs provide a basic set of editing facilities. Some, however, are more sophisticated than others. Here is a list of functions that I have found to be particularly useful:

- Give online help with commands
- Allow rapid text entry
- Find character strings
- Change character strings
- Delete character strings
- Move character strings
- Copy character strings
- Allow user to create macro instructions
- Allow user to specify defaults
- Allow user to use non-standard characters
- Automatically save changes.

Preparing the Rest of the Book

Other things that an automated text processing system could do are:

- Prepare a cover page
- Prepare a table of contents
- Prepare a list of figures
- Prepare footnotes
- Prepare tabular material
- Prepare simple illustrations (graphs, charts, line drawings)
- Prepare glossaries
- Prepare a bibliography
- Prepare an index.

Formatting and Printing Documents

After writing a document, the writer should be able format the text and then do any of the following:

- Display it on a video screen.

  The "WYSIWYG" text processors do this as a matter of course. Almost all the separate formatting text processors are also able to format the text to be displayed on the video display monitor.

- Print it on a draft-quality printer.

  The printer used should produce easy to read text and illustrations. The page layout, font style, and general appearance of a draft should be a close approximation to what the final printed book will look like.

- Print it on a publication-quality printer.

  The printer used should produce sharp, dark, well-formed characters. It should be able to print graphs, charts, and tables, as well as text. The resulting print-out should be suitable for offset printing.

Distributing Drafts

Your writers may need to distribute drafts of their manuals to reviewers or to other persons in your organization. This can be made easier if the writers have access to an online distribution list. They should be able to order address labels from this list. They should also be able to easily update this list.

Evaluating Drafts

A particularly useful feature of an automated system is the help that it can give writers in improving the quality of their writing. Word processing programs are available that can:

- Flag possible punctuation errors
- Flag possible grammatical errors
- Find misspelled words
- Find words with more than a specified number of syllables
- Find sentences exceeding a specified number of words
- Show the reading-level of a draft.

Teaching Not-so-technical Writers about Computer Tools

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Pressed for time and hindered by a lack of computer skills, many technical writers use computer systems but don't take full advantage of them. The traditional ways of learning about the systems -- documentation and formal education -- rarely are geared to the writer's task and almost always are time-consuming. As a result the writers are unaware of, or unable to use, a vast amount of helpful resources.

This paper discusses five techniques for giving writers the expertise they need to use a computer or word-processing system effectively, without getting in the way of their work. They are:

- *The writers' newsletter: documentation about the system produced by writers and geared to the specific tasks of writers*
- *The System Use Committee: a group for exchanging news about the system, sharing techniques, and solving problems within the writers' organization*
- *Classes: formal instruction designed specifically for writers and the tasks they do*
- *The system "guru": A person with a knack for tinkering with the system, who serves as a resident expert within the writers' group*
- *On-line documentation: A series of menus and tutorials by which the system presents itself to writers in terms that they understand*

As a technical writer, you probably know a great deal about the products and processes you describe. You have to. Often, however, you know very little about the computer systems you use to do your writing. If you knew more, you could use those systems more effectively than you do now -- but the knowledge doesn't come easily. This paper suggests some ways that you -- a not-so-technical writer -- can get that knowledge.

The Green-Eyed Monster

In the last ten years or so, many of us came into the field of technical communication with strong backgrounds in communication but little technical expertise. For those of us who still haven't gotten over the awe of using our first electric typewriter, the sophisticated computers we use now quite naturally appear to be green-eyed monsters.

Even if you're not intimidated by the computer, you probably never learned how to use it -- except in "watch-me-do-this" fashion with a helpful colleague during your first week on the job. That half hour or so of "training," augmented by tricks you've picked up by trial and error, somehow has carried you along ever since.

But are you working as efficiently as you can? You have a vague suspicion that, somewhere inside that computer, there's a lot of powerful stuff that can really help you. But what is it, and how can you get at it?

Taming the Green-Eyed Monster

That vague suspicion you've been feeling is correct. There *are* computer tools that can help you -- lots of them -- and new ones are constantly being developed, but you don't use them because you don't know how. Or you don't know they even exist.

Imagine you're at the wheel of a sports car that can go 180 miles an hour. Trouble is, if nobody shows you how to get out of first gear, you'll just lurch down the street and watch longingly as plain, ordinary cars zip past you.

Computer tools save time, but you never seem to have time to learn about them. This is a paradox common to just about everyone who uses computers to write. You're busy, after all, and you have little time for:

- Reading the manuals that come with the system. You may not even be aware such information exists, or know where you can find it -- an ironic predicament for someone who produces information for a living.

- Reading journal articles about new developments in computers and word-processing. Culling through the journals until you find something of interest is tedious and sometimes futile.

- Reading newsletters or memos from within your company. Some large organizations issue periodic updates for users of their computing systems. These updates, alas, seldom are written with you -- and your half-hour of training -- in mind.

- Attending classes. Heaven knows you'd like to, but the classes -- like the newsletters -- are designed for people who use the system for other things besides writing. Besides, they always seem to be held at the times when you're busiest.

- Taking the system out for a spin. Spending an hour just "playing" now and then is a great way to discover new features of the system and to use those features to make streamlined procedures for doing our work. Sad to say, it's hard to justify spending even one hour on something that might not have immediate, tangible benefits.

Techniques for Writers

When it comes to learning about the computing systems we use, then, technical writers are:

- Pressed for time
- A specialized audience with special needs.

So we need information that's

- Brief
- Relevant to what *we* do.

Here are a few techniques that have worked. Writers who use these techniques will know more about the system they use. And they might just make the whole writing group more efficient and productive. The rest of this paper will develop five ideas for helping not-so-technical writers become skilled users of computer systems.

- The *writers'* newsletter
- The System Use Committee
- Classes
- The system "guru"
- On-line documentation for the system.

THE WRITERS' NEWSLETTER

Four years ago I cofounded *VM Voice*, a newsletter that helps the writing group at IBM in Kingston, N.Y., use the Virtual Machine (VM) system for text processing. (Sue Spinner-Vincent presented a paper that described *VM Voice*, its purpose, and its style, at the 1983 ITCC in St. Louis[1].)

VM Voice succeeded beyond our wildest dreams, and it's still being written and used today. The reasons for its continuing success -- some by design, some by accident -- have been:

It's produced by writers. The editors of *VM Voice* do the same job as the readers of *VM Voice*: they use the VM system to write books. As a result they're uniquely qualified to describe the process.

The information in a newsletter should *always* be written in terms of the writer's task. Technical writers are like anybody else: the most wonderful tool in the universe will interest them only if they see what it can do for them.

The writing style is informal and engaging. The writing in *VM Voice* is casual and often humorous. It's meant to give its readers a welcome break from the dry technical material they read every day on the job. Much of the *VM Voice* is written in the second person, and the narrative tries to involve the reader as much as possible[2].

This approach tends to make the reader more interested in the material, and it also takes much of the mystery out of using VM. The system is a lot less intimidating when it's described in a simple, friendly way.

It's convenient for filing. Even if someone is too busy to read an issue right away, the *VM Voice* is easy to store in a three-ring binder and easy to retrieve when the information is needed. Each copy is pre-punched and ready to put into a binder. From time to time, the editors provide an index to the topics covered in the previous issues.

It has a clean format. Large, descriptive headings and lots of white space help readers know, at a glance, what topics appear in each issue. Thus it's easy to find the needed material even when several issues are together in the same binder.

This format -- along with the breezy writing style -- also tends to make reading *VM Voice* less a task and more a pleasure.

The editorial staff represents two viewpoints. Two people share the writing of the *VM Voice*. One, with a strong background in English but only an average knowledge of VM, keeps the material from getting too technical and keeps it focused on the audience. The other, with a good knowledge of VM (and also the ability to write well), can distill detailed technical information into a well-organized, understandable format.

THE SYSTEM USE COMMITTEE

Forming a committee of writers who use a computer system is a good way to share information about the system, solve problems together, and raise a whole organization's level of expertise.

At IBM Raleigh a *VM Use Committee* meets once a month to discuss:

- *New tools.* If someone in the organization discovers (or invents) a new tool that might be of general interest, the members of the committee get the news quickly. The committee members also form a ready-made, knowledgeable test group: they can try out new tools before the tools are made available to everyone.

- *Changes to the system.* When the system is updated, or a new policy is about to be put in place, everyone can get the word promptly.

- *Problems.* Writers get answers to their questions much faster when they can ask their peers rather than having to ask a distant programmer or operator. Many times someone on the committee has a solution. If not, the committee members can discuss the best way to go about solving the problem.

Each member of the System Use Committee represents a writing department of eight to twelve people. Within his or her department, that person is recognized as the "authority" -- the one to go to with information or problems. When problems can't be solved within the department, the representative carries them to the full committee. In turn, he or she brings back news from other departments.

The committee circulates to all the writers a report of what's discussed at each meeting. (Committee members take turns writing the report each month.) In this way news reaches *everybody* quickly, in a consistent format, and without making demands on the writers' time.

The committee becomes the focal point for all system-related items in the whole writing organization. As such it can, if necessary, become a policy-making body -- perhaps laying down guidelines for how writers should use a certain tool or planning a series of classes for new writers.

Finally, members of the committee need not be experts about the system. Like the editors of a newsletter, though, they should be in touch with how writers use the system to do their work.

The System Use Committee works well in a writing organization of about 100 people, but it probably would succeed in any group that needs better communication about system-related tools and techniques.

CLASSES

Don't you wish you'd had a little more training than that thirty-minute crash course during your first week of work? Formal classes, though they need not be lengthy, can start new employees off at a trot -- and get old employees back up to speed.

However, many classes about using the system aren't taught with you, and the writer's task, in mind. Many times they're oriented toward using the system for *programming* (remember: that's what many systems were invented for), not for writing. Even when the writer's task is considered, the teacher might not really understand it, and the result is usually a disappointing class.

The best way to have good classes, then, is for writers to teach classes for writers. Of course, if writers have so little spare time that they can't even take classes (remember?), how are they going to find time to *teach* classes? It isn't easy at first. But once a particular subject has been taught a couple of times, the class evolves into a fairly stable unit and takes a minimum amount of time to prepare.

Classes should deal with only the most important system tools. If there are classes on every little aspect of using the system, they don't just take a lot of instructors' time: they foster a "boy who cried wolf" attitude among the writers who sit through them. Once the writers get the idea that classes are a waste of time, they'll shun the important ones as well as the unimportant ones.

Classes should only be taught when a need is perceived for them. A need might arise, for instance, when a number of new people join the organization, or when there's a significant change to a procedure that a lot of people use.

Some writing groups have had success by supplementing formal classes with small, less formal ones. This works well when someone is willing to spend an hour now and then teaching a topic that isn't critical enough to cover in the formal classes. Participation is voluntary, and the small class size makes it possible to explore specialized topics or to hold the class in a terminal room where everyone can actually use the tool that's being taught.

THE SYSTEM GURU

Every organization seems to have someone who's just naturally inclined to tinker with the system. Why not turn that person's hobby into something that can help the whole group?

Webster says a *guru* is "one who is an acknowledged leader or chief proponent." If you're a manager, look for someone in your organization with an aptitude for using the system, encourage him to develop it, and make it part of his job profile. He'll reward you by:

- Making sure your group is always "state of the art" in its use of the system. Such a person is eminently qualified to use, evaluate, and recommend new tools to the other members of the group.
- Training members of the group, especially new people, on a formal and an informal basis. The kindly person who taught you the ropes probably had limited knowledge of the system; the expert can ensure that the initial contact is much more informative and fruitful.
- Being an easily-accessible focal point within the group for answering questions and offering tips.
- Perhaps, if he's also a gifted writer, producing a newsletter.

In a large organization, you might be able to assign someone this task full-time, but beware. The best candidate for this task is someone who knows what it's actually like to *write* on the system.

Many groups have a person who performs this function in an *ex officio* manner, with varying degrees of effectiveness. Why not give this person the chance to develop his skills, to the benefit of the whole organization?

ON-LINE DOCUMENTATION

Systems that document themselves are beginning to appear, but none are geared specifically to the writer's task. Still, many systems (such as the VM system in use at IBM) can be tailored to provide basic guidance to users who are just starting out.

Developing a series of simple menus and tutorials can:

- Ease new writers into the system, overcoming a lot of the anxiety you probably felt when you started out.
- Teach new writers a standard way of doing writing tasks. When that helpful person taught you the ropes back in the beginning, he passed along his personal biases -- a favorite text editor, a certain way of formatting the screen. A well-planned series of menus and tutorials ensures that everybody learns the same way, which is a big plus when new things have to be taught in the future.

The ease with which this can be done depends on the system and on the complexity of the on-line documentation itself. If you have a system "guru," this could be an assignment that'll pay dividends for a long time to come.

SUMMARY

If our goals are to communicate and to produce good, usable information, why is it so important for us to learn how to use computers? You wouldn't ask someone to cook a gourmet meal without first making sure he knew how to use all the utensils and gadgets in the kitchen.

While nobody wants to make computer virtuosos out of writers, we still should be conversant in the systems we use. ,If we're not, we can't take full advantage of what those systems have to offer, and we'll probably waste a lot of time and effort as a result.

Here, then, are tried and true ways to teach writers how to use a computer system without getting in the way of their other duties:

- The writers' newsletter
- The System Use Committee
- Classes
- The system "guru"
- On-line documentation for the system.

Try them and see how well they work.

NOTES

1. Sue Spinner-Vincent. *The VM Voice: How to Tell the Computer to Produce the Books We See in Our Mind*. 30th ITCC, 1983.
2. I'm indebted to Morris Dean, who presented his paper *Make Your Reader the Hero of Your How-to Story* at the 30th ITCC.

Tube Talk: Communicating by Computer

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Computers are as much a part of a technical communicator's job as typewriters. Computers process, format, and send data in minutes. Many writers, while fully aware of the computer's ability to do word processing, are unaware of the computer's ability to send and receive mail. In this paper, I discuss how I use existing computer technology to send and receive information. I present examples of situations in which I have found communicating by computer allows me to be more productive and makes my job easier. If you have a communication network and willing people, your computer can be more than just a word processor.

Computers are becoming an increasingly important part of a technical communicator's job. In many cases, computers have even replaced typewriters. In fact, in my professional career I have not used a typewriter to produce any document. Yes, I am part of that "new generation" of writers. We do nearly all our work on a computer, rendering typewriters and cut-and-paste obsolete. Computers process, format, and send data in minutes. I use the computer's tremendous power to send mail and documents over a network. I contact other writers and product developers without ever picking up pen, paper, or telephone.

Using computers to send and receive documents uses existing technology. With the introduction of various types of networks, sending and receiving information by computer is becoming more common. Communication networks may transmit information by cable, through telephone lines, or via satellite. The ideas that I present in this paper are ways to use these networks to send mail. Perhaps some of you already use your computer to send and receive mail. For you, I hope this paper serves as encouragement to think of new ways to use the computer. For others, I hope this paper gives you some ideas on how you can use technology that already exists.

WHAT IS TUBE TALK?

Tube Talk is computer mail, or the exchange of information using communication networks. It supplements your use of paper and the telephone. You can use the computer to send, receive, and store information quickly and easily.

As we aim for that seemingly impossible goal, a totally automated office, writers are using computers more and more. We already use computers as word processors to enter, format, and proofread our documents. These functions use only a small fraction of the computer power that is available to us. With the networking capabilities that are often readily available, we can use the computer to communicate with other people. By other people, I mean people in your department, in your project group, or in a development group. You can use tube talk to communicate with anyone who is on the same network you are on. They can be in the next office or halfway across the world. Wherever they are, communication networks enable you to send and receive important information quickly and easily.

There are many ways to send computer mail through communication networks. I use the NOTE function that is available on IBM Virtual Machine/System Product (VM/SP). Because there are many networks available, I cannot tell you how to use your system. However, I can tell you situations in which you might want to use it. You must find out what system is available to you and how to use it.

Now the question, "Why should you use your computer to send information?" I will answer that by telling you about situations in which you can use tube talk within your department, within a library of writers, and with development groups to solve or ease common "missed-communication problems."

COMMUNICATING WITH OTHER COMMUNICATORS

We are professional communicators. Why is it then that so many times we cannot even communicate with each other? Usually, we are just too busy. Sometimes, going to someone's office or even calling can take more time than you have. Either the person is not in, the phone is busy, or the person is busy. I call these "missed-communication problems." Using tube talk can help you avoid these and other common problems you encounter when communicating with other communicators.

Sending Memos

You can send all kinds of information by computer to make your job easier. Writers send memos every day—memos that tell you about meetings, classes, problems with the system, or product changes. It can take a lot of your valuable time to write, format, print, and mail a memo. Why not send the information by computer and save your time, your coworker's time, and your company's paper? You eliminate circulation, formatting, and printer delays. Because computers can easily send duplicate information to an entire group of people, it is as easy to send a memo to people who are in a group, such as a department, as it is to send the same information to an individual.

In many cases, activity reports are in the form of informal memos. Using the computer to send an activity report to your manager or supervisor lets management know what you are doing. By sending your activity report on the computer, you make it easier for your manager to reformat your report and include parts of it in his or her report. The report is easy to store and to retrieve, which is important when it is time for your manager to review your work and evaluate it.

Sharing Comments

Peer reviewing is a good way to get comments on your drafts. Some reviewers write their suggestions down, others write notes so they can discuss it later, and others just try to remember. For me, writing the suggestions down is the most helpful way to review a document. I write my suggestions and comments in a computer file. I can share my comments without interrupting my routine or my coworker's. I can put my thoughts down while they are fresh and go back later to revise them. My coworker can look at and think about the ideas *when he or she has time*. Then we can discuss them.

I also use computer mail to ask for comments from other writers and to set up appointments for those comments I need to get in person. By instructing the computer to send duplicate information to an entire group of people, it is easy to send information, comments, and requests to each member of the group.

COMMUNICATING WITH DEVELOPERS

Communicating effectively with people who develop hardware and software products can be a difficult task. They are busy and sometimes do not like to be interrupted. Some developers find it hard to work with writers—they say we ask too many questions!

The "missed-communication problems" I have encountered with development groups are varied. I encounter the common problems of busy phones and busy developers. I also encounter problems that are less common within writing groups, such as an unfamiliarity with what the writer needs to know and the extensive, almost overwhelming, use of jargon. Using tube talk can help you avoid these and other problems you encounter when communicating with developers. Let me tell you about a few situations in which communicating with developers by computer could make your job easier.

Asking Your Questions

"Oh, No...What Was I Going to Say?"— When you are in a foreign country, you use the native language. When you are in a region of that country, you use a dialect of the language. It is the same principle when you are talking to developers. You are in their region so you should talk as they do, jargon (provided you understand it) and all.

By using tube talk to send questions and requests to a developer, you have time to compose them, and you have time to modify them as you get more information. You can gather a number of related questions and ask them all at once without forgetting anything important. You can use jargon and product-specific terms so you sound like a native. Sounding like a native is the next best thing to being one.

"Did Someone Already Ask That Question?"— Asking questions twice not only wastes time but it limits your credibility. People are busy and do not want to repeat the same answers, even if the questions are asked by different people. Using tube talk can help you and the other writers you work with prevent these types of mistakes.

When working on a project, it can be difficult to remember what you have asked and what you have been told. By sending your questions and requests, you automatically have a record of the questions you have asked and when you asked them. If they are stored in a common computer file of similar information it is easy for you and other writers to check to see if certain questions about the product have already been asked and satisfactorily answered.

Getting Answers

"I'm Busy Right Now!"— We have all had an experience of calling a developer with a question and hearing him or her say in an irritated tone of voice, "I'm busy. I'm in a meeting right now." Well, we are all busy and playing "telephone tag" is a waste of our valuable time. Using computer mail can alleviate this problem.

A computer is not deterred by the fact that someone is busy. It will not interrupt anyone with questions, comments, and requests. It will store information until the recipient is ready to receive it. The recipient can look at and think about the questions *when time permits*. You probably will develop good working relationships with people who can deal with your questions and comments when their schedules allow them to.

"I Don't Know"— This is a common statement when you are working on a developing product. Things change so rapidly that no one can keep up with everything. Using tube talk gives people a chance to find an answer to a request or question when they have time. I have found that I get more satisfactory answers when I have given the developer time to find an answer or to find the person who has the answer.

STORING AND RETRIEVING YOUR QUESTIONS AND ANSWERS

The computer's forte is storing and retrieving information quickly. You can retrieve the most recent version of a document in minutes. You can find out who wrote what and when they wrote it. Storing your questions and answers and then retrieving them is one of the biggest advantages of communicating by computer.

"Where Did I Put That Information?"— Writers get documents and answers from a number of sources. Keeping track of those sources and what they have said is not always easy. Once you have ferreted out relevant information, you need to be able to find it after you have stored it. Storing information on the computer can help you keep track of source data.

I store information that I have sent and received in computer files that are organized by subject. I have computer files that contain information about product planning, software development, hardware development, and marketing. For example, all computer communication with the product planner is stored in a file called "Planning Info." Information within each file is organized by specific keywords so it is easy to retrieve the information you have sent and received. I use keywords, such as "objectives," "testing," "installation," and "contacts" to locate information on particular subjects.

Another advantage to exchanging and storing information on the computer is that information that you get via the computer can be documented. The computer can store information about who sent it and when. If you need clarification or an update, you can go back to the source file and find out who to ask and what to ask.

IMPLEMENTING TUBE TALK

Now you know a few ways you can use tube talk. Because each computer system is unique, I cannot tell you the specifics of how to use your system to send and receive computer mail. But, I can tell you two things that everyone needs to implement tube talk.

First, and probably more important, you need a communication network that you are able to use to send, receive, and store data. There are many types of networks already available and more are being developed. Communication networks may transmit information by cable, through telephone lines, or via satellite.

The second thing you need is a group of willing participants. Although tube talk can be effective when used by an individual, for the concept to be most effective, everyone in your writing group should participate. People should check daily to see if they have received computer mail. Everyone should work together to find a way to store information so it can be easily retrieved later and everyone should discuss problems and possible solutions.

The development groups you work with must also be willing to participate. In my experience, most developers appreciate tube talk. Many of them work on a computer all day, and they like communicating through a familiar medium. But I cannot speak for all developers. Find out their personal preferences and act accordingly.

Sending Information

The way each computer sends information will vary, but I will tell you some of the things you might expect to have to know to send information. For example, you have to tell the computer who to send the information to and where the recipient is located. This basic addressing information will be the same for most computer systems. I store this information in a file I call a "computer address book."

A Computer Address Book: The computer uses the entries in a "computer address book" the way the post office uses names and addresses. To address mail, the computer must have a user ID and node ID. Many systems will also store information you can use, such as names, addresses, and telephone numbers. I try to store all the addressing information I can gather. That way, I keep a record of computer addresses and conventional mailing addresses.

I keep information on the following items in my "computer address book":

User id: The user id is the name the computer uses to identify a person. Every person who uses a computer has a user id. (It is also called a logon id.)

Node id: The node id is the address the computer uses. Think of it as the street, city and zipcode in one word. It tells the computer which part of the network to send the mail to.

Name, Address, Telephone number: Some computer systems use the name, address, and telephone numbers in the header at the beginning of a note. (This is one way the computer documents mail.) I use this information the same way as I use a conventional address book.

List of Names: The list of names allows you to organize people into a group. You can send any information to the entire group of people as easily as you can send it to an individual. You are still able to communicate either with each person individually, or with the group as a whole.

This information should get you started. I hope I have shown you some new ways to use an old friend—your terminal.

If you have a communication network and willing people, your computer need never be just a word processor again! As computers and networks become more advanced, the uses for tube talk will become more advanced also. Be creative and keep abreast of developments and you can use tube talk to make your job easier and you more productive.

Computer-Based Training

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ABSTRACT

With the big push to automate, reaching into nearly every industry and office across the nation, managers are faced with a two-pronged problem:

- Overcoming the average worker's fear of automation
- Providing effective training on systems for each new worker -- a real headache in the office with high turnover.

Many technical communicators faced with documenting these systems and providing effective training programs are turning to computer-based training (CBT). CBT can be general ("how to use your microcomputer") or specific ("how to install the XZY1-B2100 on the VFW257") in nature. It is proving to be a very effective tool in overcoming the first-time user's retention of material covered.

What programs are available on the open market? How do you design your own CBT program? Why is this one of the best ways to train the user of automated systems in the 80s?

INTRODUCTION

In this paper by Karen Steele and Linda Bell two types of microcomputer-based training systems will be presented:

- Commercial, ready-made systems, and
- Custom systems.

Methods and pointers are given on how to design a training package that can be used on microcomputers, specifically IBM PCs, with ideas included that are adaptable to any micro.

Presented are features and advantages to this kind of training and how to go about designing the package and preparing cost estimates. Generic training on how to use a microcomputer and how to be comfortable with office automation is featured, as well as custom training packages for specific software.

The Use of Computer-Based Training on Microcomputer Systems

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COMPUTER-BASED TRAINING?

Because microcomputers in the workplace are the wave of the future, nearly everyone, clerk to executive, needs to learn how to use them effectively. And what better method is there for learning how microcomputers work than computer-based training on those same microcomputers?

This discussion is limited to CBT geared to the microcomputer.

CBT is a logical choice as a training system for many reasons, including the following:

- The computer-phobic employee, clerk and executive alike, can overcome anxieties about new technology being implemented in her/his workplace with hands-on experience, in private. In essence, what CBT provides is a risk-free psychological environment for learning because only the machine witnesses how many tries each student requires to master each point presented.
- Training can move at the proper speed for each user. This is especially important as an alternative to training in large groups, in which slower students are often left behind in confusion while quicker ones sit by, bored, waiting for the class to catch up.
- Training can be interrupted and restarted at the convenience of the trainee.
- Learning is reinforced with displays of materials just covered and with sound.
- CBT is cost-effective because employees may be trained and retrained without interrupting the work of others, and without waiting for the arrival of a trainer.
- Software documentation can be incorporated into the training program, making the bulky user's manual unnecessary. When a printed copy of a procedure is needed, it is a simple matter to print out only the appropriate material. In this we are moving ever closer to the phenomenon of the paperless manual.

COMMERCIAL VS. CUSTOM CBT

In our session, two kinds of microcomputer-based training systems are discussed. Commercial, ready-made systems are designed to acquaint the first-time microcomputer user with a particular brand of hardware, such as the IBM PC. Custom systems are produced in-house by technical communicators on staff.

COMMERCIAL CBT

There are a number of CBT programs on the market for each of the major systems. Before selecting one of these for your firm, it will be well worth your time to evaluate several alternative systems. For example, if you will be using accounting systems, you may be looking for a training system with emphasis on the mathematical side of computers. If you will be using word processing applications, you may be led to another choice.

What to Look For in Commercial CBT

When choosing a package, the things to look for include:

- Graphics. If you have a color terminal and color card, make use of these in every way possible.
- Sound. An example of effective use of sound is the playing of a few bars of "Taps" for a wrong answer and the "Charge!" motif for a right one. (A little humor never hurts.)
- The game approach. For example, in teaching any process, does the system invite the trainee to beat the system average for correct answers? If a training package is entertaining, it is likely to do away with trainee fear.
- "User-friendliness." The training system should be at the proper level for your company's trainees.

Some Sample Packages for the IBM PC

Some commercial systems available for the first-time IBM PC user include:

- Micro-PLATO, by Control Data Corporation. This is the microprocessor version of PLATO, CDC's on-line, computer-based educational system.

- The Instructor, by DELTAK. This firm also produces a complete line of educational systems.
- The INSTRUCTOR, by Individual Software. This is a very popular package with sales trainers.
- PC PAL, by Comprehensive.
- PC TUTOR, by Comprehensive.

CUSTOM CBT

For large systems, especially if your firm is an independent software house, custom-designed packages may be a better choice than a ready-made package.

Packages such as LIBRARY and PRIVATE TUTOR (both for the IBM PC) permit nontechnical people to design screens and logic themselves. However, those who are not at ease with the microcomputer and do not find detail work fascinating might find this the hard way to start. We recommend making use of available technical resources to turn the training programs you design into a system.

How to Calculate the Cost of Custom CBT

To calculate the time and money required for the development and maintenance of a CBT system, take into account the following:

- Programming time
- Development time
- Testing time
- Computer time

The determination of when the expense of custom-designed CBT is warranted is a difficult one. However, we find that the assumption that CBT should pay for itself in 18 months is reasonable, if CBT system maintenance (with system updates) is built into that cost. The problem, of course, is that computer applications are outdated so rapidly that the five-year longevity rule of thumb no longer applies.

Some Tips on CBT Development

In designing a CBT system, work from flow charts. Each point to be learned is best presented on its own screen. And remember that each point should be made three times -- "Tell 'em, try 'em, test 'em." The optimal organization is one point per screen, three to five points per section. The size of your system is not important, but the size of sections is. Make the system big enough to cover the topic, but keep the sections short enough to be easy to master.

IN SUMMATION

The mastery of CBT selection and production techniques is essentially an extension of your technical communications skills. We hope that you will be able to apply the points we've raised in our session to work in this rapidly growing field.

Evaluating Computer User Documentation

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ABSTRACT

Responding to the topic "Evaluating Computer User Documentation", this panel will first identify the needs for different types of documentation by considering the following:

- product
- environment
- user.

After identifying these needs, the panel will then consider how to design these documents.

INTRODUCTION

This panel will present two approaches to assisting with this problem.

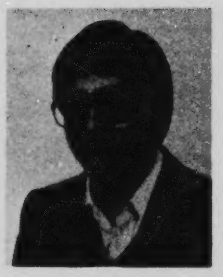
Steven Jung in the paper "Documenting the New Computer" addresses the special requirements when documenting the microcomputer as opposed to the larger computers. Most of the documentation on micro and minicomputers is an attempt to reinvent the wheel. Here, different approaches are presented. Format and tone are discussed. General guidelines are provided along with items to adopt in general and items to avoid in particular. A discussion of the difficulties of merging both tutorial and reference material is presented. Another point stressed is the importance of correct temporal sequence when writing user documentation.

Michael Bergman in the paper "Guidelines for User Documentation - What Is Needed?" recognizes that computer software, and therefore its documentation, is too diverse and dynamic in its function, scope, implementation and packaging to permit any form of universally applicable categorization. Thus, no by the numbers set of standards for each classification of documentation can be provided. Instead, writers should consider the following:

- Identify the useful analytic guidelines that a writer can use in determining the documentation scheme (or information response).
- Propose guidelines and methodology to be used in developing the documentation.
- Illustrate alternative approaches to computer software documentation and discuss factors behind determining the organization, format, content and packaging.

Documenting the New Computers

Steven F. Jong



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Faced with fundamentally new products and virgin audiences, microcomputer pioneers set about reinventing the documentation "wheel." The results have been dissatisfied users and a thriving computer-book industry. Many of us will document microcomputers for a new and inexperienced audience; we can learn from past failures and past successes.

The new computer user needs three classes of information: reference, tutorial, and summary reference. The approach should be carefully planned; task-oriented, not product-oriented; and clearly mapped. Manuals should be user-friendly and easy to use (of course), not overly detailed, strictly in temporal sequence, and rigidly accurate.

Electronics technology has taken the computer from the "machine room" to our desktops and to our dens. Thousands of people, from experts to novices, own systems. Most mainframe computer vendors now offer microcomputer products. Colleagues, if you haven't yet documented a microcomputer, wait a minute.

What's involved with documenting these new computers? What can we learn from existing documents? What does this new lay audience need? To summarize the answers: we can learn a lot; every conceivable mistake has been made -- and published; and the lay audience needs writing of unprecedented skill and clarity.

EXAMINING THE FIELD

Historically (if such a perspective is possible with a field so new), the new computers' designers and programmers have documented their products themselves. One result has been a stream of complaints about inadequate documentation, including epithets such as "garbage" (1) and "unreadable" (2). Another has been the startling success of second-party "how-to" books, written by communications professionals. Computer books are now the fastest-growing category in publishing history. Sybex Computer Books alone publishes two books on the best-selling WordStar word-processing software package. A Sybex spokesman says, "If WordStar's (three-volume manual set) was as good as our books, then we wouldn't have written the books" (2). Xerox distributes an "outsider" book with the Digital Research CP/M operating system rather than Digital Research's own documentation (3).

What are the significant features of the new computers? For one thing, the products are fundamentally different from what we're used to. The new computers are designed for ease of use, with simplified hardware (that one doesn't bootstrap but merely turns on) and new interfaces (menus, mice, and touch screens). Their packaging blurs traditional distinctions between hardware and software. A galaxy of applications software turns the new computers into graphics generators, word processors, spreadsheet manipulators, program generators, and more.

The audience is also new, also fundamentally different from the readers of our acquaintance. The new computer users span the experience spectrum, but mainly are inexperienced, untrained, and sometimes even computer-phobic. Christman (4) points out that to these users not only company-specific acronyms and jargon but even basic terms such as "byte," "buffer," and "flip-flop" are new. Worse, there is no opportunity to educate most users through training courses.

MISTAKES HAVE BEEN MADE

New computer documentation has included many new approaches. Often, these experiments have failed badly.

The first approach was to write a single manual covering all aspects of the product. The need for more manuals (notably tutorials) surfaced, and more were written; but not necessarily by the same person, in the same style, or for the same audience. The result has been manual sets without an overall design, clear entry points, or reading paths. Apple documentation suffers from some of these problems. The overall effect of layered manual sets is rather like working an archaeological dig: As you work down through the layers, you learn the product's history.

One-man shops have produced single manuals intended to cover different hardware configurations. Consider a manual for a CP/M-compatible software product that includes configuration information for all CP/M-compatible hardware, and you'll realize the difficulties of that approach. Another noticeable weakness of one-man efforts has been the lack of competent editing.

Audience level has presented stiff challenges. Some writers have tried the same monolithic prose style that mainframe users endure. However, the new computer users can choose their products, and don't choose those. Other writers have responded with an excessively -- even painfully -- chatty approach, insulting the intelligence of much of the audience. Chavarria (5) notes that many writers have mistaken "cuteness for friendliness. This cuteness comes in the form of books written in conversational slang or from the point of view of a machine."

Because of the lack of training opportunities, tutorial material is an obvious requirement for the new computer users. But tutorial material isn't easy to write. Few of us are qualified or experienced in education. Some tutorial material on the market today is amateurish, misleading, incorrectly paced, or insulting. Another problem: The more detailed the tutorial, the more readers expect utter accuracy. Any mistake is therefore completely disruptive. Cooper et al. (6) concluded that IBM chose to ignore novices in its Personal Computer documentation.

Some writers have faced the task of concealing system problems from the reader. Even the new computer software can be downright hostile (cf. Norman's comments (7) on UNIX). It's impossible to document a complex, inconsistent, or unfriendly system as easy to use; writing something does not make it so (8). Beware of writing something like: "This is a common mistake that even experienced programmers make." You won't fool anyone, and you are probably committing an ethical gaffe. (At any rate, you don't want to give the impression that users don't need the manual!)

New-computer documents from old computer vendors have suffered ill effects from large, sedentary publications groups, where no one knows the new audience, a patina of tradition keeps the documentation from effectively reaching out, needed stylistic changes are opposed as degradations of standards, new formats are opposed as wastes of space, and difficult procedures are left for mythical "supervisors," not the users, to handle. Until recently, my company has had some of these problems.

Finally, there have been some appallingly cheap manuals, typewritten or printed on low-quality dot-matrix printers, stapled, photocopied, fairly screaming "afterthought!" to readers. Many lack tables of contents, glossaries, or indexes.

Yet none of these problems is unique to documentation of the new computers. Some are just old problems in a new setting. Consider these article topics chosen from the 1965 index of the STWP *Journal*:

- Language employed by programmers
- Acronyms
- Manual standardization
- Passive voice
- Counteracting erosion in style
- Cost savings in page lay-outs (sic)

Not every experiment has failed. There have been refreshing uses of tutorials (Metasoft's BENCHMARK), tone, color (Innovative Software's SpellGuard), and printing (SOF/SYS's Executive Secretary). The successes of new documentation have refuted the moribund style of mainframe documentation. And we have learned that successful ideas in the new-computer marketplace work as well for the old readers.

WHAT DOES THE USER NEED?

What can we learn from the millions of new-computer manuals? The items below are safe bets.

First, know your audience. Second, organize documents around tasks, not products. As described by Hadley (9), describing how to perform tasks is more effective than describing how to use a product. Task-oriented documents are by definition easier to use. Task-oriented documentation lends itself particularly well to the solution-oriented new computers.

Keep to a temporal sequence. For instance, the first instruction on entering data should be how to correct mistakes; the first instruction on creating files should be how to back them up. Remember -- there are people using your document as a step-by-step cookbook.

Exclude extraneous material. A four-paragraph explanation of cursor behavior at the edges of the screen in your word-processor manual adds more bulk than light. Hadley and Howard agree that boundary conditions, while important to some, confuse the issue for most (9, 10).

Shed corporate stuffiness and be user-friendly! User-friendly seems a matter of style, and therefore not verifiable. In concrete terms, what is user-friendly documentation? Chavarria (5) describes user-friendly as exhibiting a touch of humanity, and argues persuasively for adopting the techniques of dialogue (instead of the more prevalent monologue). Summarizing her points:

- Avoid facades (use no jargon)
- Reveal yourself (use second person)
- Seek understanding (know the audience)
- Express positive regard for readers (also called "ease of use")
- Show equality (don't be cute or condescending)

From my observations, the last point is the biggest microcomputer documentation trap.

Make the manuals easy to use. Lenehan (11) discusses the basic characteristics of easy-to-use manuals. Note the similarities to Chavarria's points:

- New terms and topics are introduced clearly and simply
- Organization and production allow quick, random searches
- Examples are unambiguous and simple
- Text is liberally seasoned with cross-references
- Second person and active voice are used
- All jargon is decoded

Make no unwritten assumptions about user knowledge. Readers aren't stupid, but they sure can be inexperienced (11).

In tutorial material, allow no mistakes and no deviations from the procedure. This is crucial! To a virgin computer user, the most trivial error is a blocking problem, especially with no other ready source of help available. Decide beforehand what needs to be taught -- just formatting diskettes, or mounting them too? Since you'll be dealing with a wide range of users, allow several entry points into tutorial material by arranging it into blocks.

Integrate hardware and software information. The distinction is much less important to the new computer users. This involves new areas of study for most of us.

There is a perceived need for "small" (5.5 by 8.5 inch) documents, which are seen as less intimidating. IBM was among the first to realize that new-computer software buyers are attracted to the manuals and their binders, not the diskettes.

A CASE STUDY -- EASYWRITER

Information Unlimited Software (IUS) released the EasyWriter word-processing package for Apple II computers in 1979. Two years later, IBM chose EasyWriter as the word-processing package it would offer with its Personal Computer. At that time, IBM totally rewrote the EasyWriter documentation, leaving only a few passages unchanged (12, 13). There were inevitable differences due to the hardware change, actually simplifying the IBM version and thus its documentation. Laying this aside, a listing of IBM's alterations is most revealing. IBM:

- Typeset its manual, keeping the small-book format

- Retained the second-person plural flavor, but dropped self-deprecating humor

- Chose a less condescending tone

- Corrected the temporal sequence

- Began with differences between a typewriter and EasyWriter (word processing concepts)

- Deleted the IUS marketing product brief disguised as section 1

- Deleted a "gee-whiz" example that didn't show the product so much as show it off

- Moved the discussion of backup and revision to page 1-3 (previously, this information was relegated to pages 3-7 and 3-3, respectively)

- Broke out text procedures into numbered, step-by-step instructions

- Inserted an explicit, though terse, tutorial example

- Reorganized section 5 into several appendixes

- Added a five-page index

CHALLENGES FOR THE FUTURE

What will the new computer documentation demand of the technical communicator?

We will have to design integrated manual sets for dynamic, growing products. Manuals must be task-oriented, which will be more difficult to write; and they must have clearly marked entry points.

In the new computer manuals, the distinctions between hardware, software, and firmware will be unimportant. The user doesn't care which chip has detected an error; the user only wants to know what to do about it. For most of us, learning the other half of the industry will be a challenge.

Tutorials will become more important than, and perhaps even replace, reference material. We will have to draw upon the experience of educators and not reinvent that particular wheel. This will open opportunities for "recycled" teachers.

The new computers will rely heavily on online documentation, which will force us to adapt to an entirely new communications medium (14).

In our role as user advocates (and if we're fortunate enough to get into preliminary design), we must be alert for software and procedures that look impossible to document as friendly or easy to use. Chances are, they aren't.

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Establishing, Maintaining, and Using a Computerized Publications Data Base

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This workshop demonstrates how a publications staff of technical writing/editing interns (non-programmers, all) in conjunction with one staff programmer, made efficient use of available in-house resources and helped begin the design and development of a time-saving, menu-driven, user-friendly, and cost-effective publications data base at the Physical Science Laboratory (PSL).

As technical writing/editing interns at PSL, it didn't take us long to discover what everybody else involved in publications already knows: there is usually too much to do and not enough time to do it. Boilerplate was seen as a time-saver for text production. But the task of modifying this stored information for every specialized application often proved awkward and ineffective.

Boilerplate users (both technical author and publications editor) quickly saw the need for a more efficient publications data base--one that saved time and money and was dynamic enough to meet the constantly changing, diverse needs of its users. So, using available resources within the laboratory, and enlisting the services of our resident programmer/systems analyst, we started a new method for managing text that has so far proved superior to the old.

The computerized data base is capable of almost infinite flexibility. Text can be added or deleted, moved and rearranged, indexed, cross-referenced and printed in a variety of typefaces and formats. Our system is menu-driven, which means that users can select from a variety of functions, including keyword search, data retrieval, and hard-copy output. In short, users enjoy the standard advantages of word processing and limited data base management. Making efficient use of these capabilities requires a knowledge of the computer system as well as the contents of the data base (e.g.,boilerplate, contract summaries, resumes).

At PSL we have a local computer network centered around our IBM 4341. The 4341 runs SCRIPT word processing software. Linked to our IBM 4341 are several IBM System 6 (OS/6) word processors, Model 204 Data Base Management System, and Professional Office System (PROFS). The OS/6 does not use SCRIPT, but an operator can use the System 6 to convert SCRIPT commands to OS/6 readable commands if the IBM 4341 is down. Both the System 6 and the 4341 are linked to an IBM 6670 laser printer. Model 204 is a Data Base Management System used for accounting, cost reporting, resource management, and related decision support functions. PROFS is an intra-office network with limited word processing, scheduling, and communications capabilities. We also have IBM Mag Card II typewriters, and ink-jet 450 Printers to back up our more advanced equipment.

Information for our data base is placed on magnetic disks or tape and is usually maintained in several copies. Keeping the data base updated is a continuing chore. We maintain three record levels: master record, master backup, and working record. The data in the working record may be changed by anyone using it, but the master files cannot be changed without authorization. This ensures that no ill- considered changes will be made. The master records are updated periodically.

At PSL we have developed a cost-effective, versatile method for establishing, maintaining, and using a computerized publications data base. Our system is cost-effective because its development required relatively little time from our programmer and no new hardware. Also, it is easy for non-programmers to use because it is menu-driven. Finally, our system succeeds or fails on the basis of its capacity to save time and to increase productivity and quality. By these criteria, PSL's new computerized publications data base has been a resounding success.

Boiler Plate to Data Base: A Step Toward the Office of the Future

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New Mexico State University's Physical Science Laboratory (PSL) uses an electronic boiler plate system for storing and revising documents used in proposals, capabilities statements, and brochures. As technical writing interns, we realized after our first few projects at PSL that the boiler plate system would be more useful if it were cross-referenced and if it were easier to access. With the help of personnel from data processing, we are transforming the boiler plate to data base. This project has led us to consider the publications process at PSL as it relates to current trends in office automation that affect our future as technical writers.

Introduction

As technical writing interns at New Mexico State University's Physical Science Laboratory (PSL), we inherited a newly developed electronic boiler plate system for storing and revising documents used in proposals, capabilities statements, and brochures (see "The Automated Systems Approach to Proposal Production," Dressel et al, ITCC Proceedings 1983). After our first few projects at PSL, we realized that the boiler plate system could be substantially improved in two ways: (1) the boiler plate could be stored online to provide easier access to it, and (2) it could be cross-referenced to facilitate the kinds of searching and sorting frequently needed for Laboratory projects. In effect, that meant transforming the electronically stored boiler plate into a publications data base. Making that transformation without the benefit of new equipment or software packages has required innovative use of existing equipment and the combined efforts of both data processing and word processing personnel .

Data Entry and Storage

Our electronic boiler plate comprises three kinds of files: personnel files (resumes), general capabilities and facilities statement files (narrative descriptions),and related experience files (contract summaries). Word processing operators enter and store these files using three generations of word processing equipment: magnetic card typewriters, IBM System 6 (OS/6) dedicated word processors and computer terminals.

Operators type resumes using magnetic card typewriters or the IBM Office System 6 word processors, and store the information on magnetic cards. PSL uses magnetic card typewriters for resumes for two reasons. First, the capacity of a mag card is about one page -- the length of a typical resume used in proposals. But more importantly, storing each resume on a separate mag card lets us feed any resume into a document wherever it's needed.

Word processing operators enter general capabilities and facilities information, the second major type of file, on OS/6 word processors and store the information on diskette. Since we frequently use capability and facility information in proposals, entering these files on the OS/6's is convenient because PSL uses these machines to generate most of its proposal documents.

The third important type of file contained in the electronic boiler plate is the contract summaries. Because they vary in length from several paragraphs to several pages and require frequent updating, contract summaries are entered on terminals and stored in mainline storage. This method of storage simplifies the exchange of contract information with PSL's contract office, which also stores its information on the main computer system.

Boiler Plate to Data Base

As we worked on early assignments, such as reformatting resumes, polishing the text of capabilities and facilities statements, or updating contract summaries, we began to realize the limitations of our system, and to think about ways to improve it. The major advantage of the boiler plate system that we inherited was ease of revision. Since everything was stored electronically, albeit by three different means, word processing operators did not have to retype a document in order to make textual changes. But with three generations of word processing equipment and modern data processing facilities, we felt our boilerplate system should offer more sophisticated services to its users than simply ease of revision.

It seemed logical that the next steps in the development of our document handling and storage capabilities should be to make information more accessible, and to index or cross reference it so that searching for specific information could be done faster and more thoroughly by computer. For example, all access to the electronic boiler plate is through the word processing center, requiring the assistance of word processing personnel. If project managers need specific resumes, for example, they must ask for the resume files. If they want to search the resume files for someone with a particular skill or experience, they must physically search through the resumes in the file drawer until they find what they want. By storing resumes in mainline storage and cross-referencing the data according to retrieval keys such as name, experience, or skills, a publications data base would vastly simplify access and search, requiring only access to a terminal.

Word Processing and Data Processing

We wanted to transform our electronically stored boiler plate, a word processing application, into a publications data base, an application requiring help from the Data Processing Group. Fortunately the Word Processing Group at PSL has worked closely with the Data Processing Group. Several employees in the data processing section began as operators in word processing, making the transition as a result of their interest in and increasing knowledge of computer technology. Also, Word Processing handles some of the administrative functions supervised by Data Processing, such as the processing of bimonthly time sheets for all Laboratory personnel.

To get help in changing our boiler plate to a data base, we consulted Dennis Grover, programmer analyst and head of the Data Management Group of the Data Processing Section. Dennis considered four approaches to the solution of our problem. The simplest and easiest solution would have been to purchase a software package called STAIRS (Storage and Information Retrieval System) from IBM. Unfortunately, it was also the most expensive approach.

A less expensive solution was to adapt something that we already had. Possibilities included using PROFS (Professional Office System), basically an electronic mail system for generating, sending, and receiving documents; IBM's Model 204, the data base system used at PSL for personnel, accounting, and cost administration; or a tailor-made system which Dennis would design. After weighing the merits of each of these options, Dennis designed a unique system for our specific application.

Programming in assembly language, Dennis created a menu-driven system of full-screen panels. Users can gain access to these panels in the CMS environment, and then control the panels through the program function (PF) keys on our IBM 3270 terminals. Dennis used IBM Exec for most of the controls, such as moving the cursor, clearing the screen, and entering data. He created the macros in Xedit, the text editor of the SCRIPT system.

Dennis performed four steps in his initial demonstration. From the CMS environment he typed WPDB (for word processing data base) on the terminal. This produced a master panel with two options: PF1 enabled him to search for a resume; PF12 returned him to CMS. The panel obtained by pressing the PF1 key displayed a list of key words which Dennis had composed for the demonstration. Entering one of these key words produced a list of names of people whose resumes are related to the key word. Dennis then entered the name of the person whose resume he wanted to see, and the resume appeared on the screen. In the future we will be able to obtain a printed copy of the resume or to merge it with another document that is being printed.

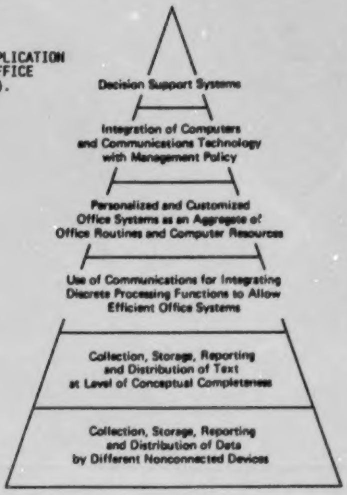
At this point in the development of the data base, the technical writing interns will read all of the resumes and derive a list of key words through which resumes can be accessed. We will do the same with contract summaries, so that ultimately the same key words will produce both resumes and contract summaries. This capability makes valuable information available for use in bid-no bid meetings, and in the early stages of proposal production when management and technical teams are being assembled. While we plan to add the capabilities and facilities information to the data base later, we have no plans to cross reference it.

One of the advantages of Dennis' system over similar systems is that the information search scans only preselected, related descriptors. This means that the descriptors don't have to appear in the document, since the search does not scan the rest of the document. Our system also provides a faster search, but demands more programming time to set up the files.

The Office of the Future

Working on the data base project made us take a closer look at the publications process within PSL; it has also caused us to consider the changes that are taking place in the technical writing environment. Automating boiler plate information and creating a data base are merely steps in a progression toward what is now commonly identified in our field as the "office of the future." The progression is based on the rapidly developing technology of the computer industry and manifested in our field by the development of new equipment, which leads to the development of new applications that lead to more efficient ways of doing our work.

Experts say the office of the future will "combine computers, word processing, micrographics, automated retrieval, voice input, optical character recognition (OCR), and telecommunications technologies into an integrated information management system (1)." Office automation expert Dimitris Chorafas outlines a six step progression toward the office of the future, representing the steps graphically with a pyramid (below) to emphasize that the process entails successive levels of integration. Higher levels of integration are characterized by increasingly enhanced communication facilities, allowing greater access to information and greater selectivity in accessing it. The apex of the pyramid, the office of the future, will operate with computer-based decision support systems (2).


Decision Support Systems
Integration of Computers and Communications Technology with Management Policy
Personalized and Customized Office Systems as an Aggregate of Office Routines and Computer Resources
Use of Communications for Integrating Discrete Processing Functions to Allow Efficient Office Systems
Collection, Storage, Reporting and Distribution of Text at Level of Conceptual Completeness
Collection, Storage, Reporting and Distribution of Data by Different Nonconnected Devices

SIX LEVELS OF APPLICATION
LEADING TO THE OFFICE
OF THE FUTURE (3).

One of the significant points in PSL's progress toward the office of the future has been the acquisition of an IBM 6670 Laser Printer. The Laser Printer provides a link between our IBM Office System 6 word processors and our mainframe system. Linking the word processing facilities with the computer system, run by the Data Processing Section, represents a link-up between the Word Processing Center and the Data Processing Section, which has led to projects like our data base development. The combined efforts of the two groups should lead to increasingly sophisticated applications for word processing.

The convergence of word processing and data processing may be a natural step, but it can be a difficult one. We have an online word processing facility, SCRIPT, available to us, but we continue to do most of our word processing on the System 6's. The advantages of the 6's at this time are availability (the mainline system doesn't have to be running), training (the menu-driven Sixes are thought to be easier to train on), and cost (there is no charge for computer time). These advantages may be short lived because of offsetting advantages in using the mainframe system.

Using the mainframe system would allow originators to enter their work on a terminal and send it to word processing on the system, eliminating the need for a key operator to decipher their handwriting and key in the work. Ideally, the author could also call up the data base and incorporate material from it in his/her document. Proofreading and editing could also be done on a terminal, so no paper would be needed until the final draft. The cost savings might come through reducing key operator time rather than computer time.

Word processing is still basically a typing service, and one aspect of the office of the future, voice input, may even make typing an obsolete office skill. With the loss of the key operator, ease of training on the stand-alone word processor becomes a moot point; however, training on all systems should become easier as more user friendly software packages are developed. The complexity of formatting is one of the chief sources of the need for dedicated word processing operators. Organizations such as PSL, which must produce long documents in short periods of time by coordinating material from many sources, might need dedicated operators even if they do obtain voice input capability.

As for the disadvantage of using SCRIPT caused by the fact that the computer system shuts down at night, we could keep the system running around the clock. But another trend may eliminate the necessity of that consideration: if data processing and word processing become distributed through the widespread use of personal computers, demand for services from both departments might be significantly reduced.

The Technical Writer of the Future

One of the most notable trends that we've observed in the progression toward the office of the future is recurrent integration. Skills and facilities develop separately and are then combined to form more capable machines and more capable people. For example, hardware and software have merged to become firmware. Computers such as the IBM 360 have been developed to perform science and business applications that formerly required two computers. Word processing operations have consolidated discrete units of equipment into single machines such as the OS/6's. Office operations in the future are expected by some experts to integrate word processing and data processing applications on desk-top personal computers. Word processing administrators and data processing administrators are, in some instances, becoming Management Information System administrators and supervising both functions. What are the implications for us as technical writers in the future?

Integration of job roles and skills may be the key to the future. Just as word processing and data processing are merging into a single information management function, so too will writing and editing merge with other information and communication functions. As nonprofessional writers perform more of their own word processing, they will need technical writers to help them secure, generate, organize, and distribute information.

The technical writer in the office of the future will be an integrated information specialist.

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Training for Word Processor Applications

Stan D. Green, Moderator

Nancy L. Karner, a technical writer from the IBM Corporation, Virtual Machine Development discusses the working relationship among software developers and technical communicators to assume more accurate source material. A middle ground does exist between full trust and absolute distrust of all engineering documentation. Ms. Karner believes that both groups have much to gain by working together, with the user being the winner.

Sherry K. House, a technical writer of computer systems and an instructor of software products for Superior Oil Company, talks about how to document and train with manuals. She expands the role of the writer as a technical communicator to include that of a trainer.

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How to Keep a User's Manual Alive: Train With It

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ABSTRACT

In this paper, I will discuss how one technical communicator attempts to keep her documentation alive by:

- *Using a step-by-step approach to teach the subject matter rather than a topic-by-topic arrangement.*

  This: *Step 1 - Check your terminal.*
  Step 15 - Quit.

  Not This: *Forms*
  Reports

- *Using a lot of graphics including screens, exhibits, shading and arrows.*
- *Using the manuals in training classes to supplement verbal instruction and practice on a terminal.*

INTRODUCTION

After an author has painstakingly produced a user's manual, there is almost nothing less rewarding than to have the manual stored on a shelf and never used. In addition to the pride in one's work, there is a nagging awareness that the information in the manual could make the user's job easier.

Many times at work I have seen a person sit in front of a terminal, struggling to guess what the next procedure is. Watching this would-be user, I want to ask, "Don't you have a training manual?"

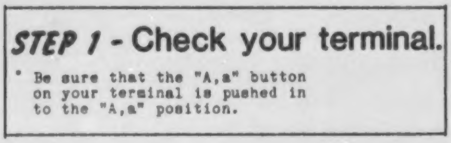
To demonstrate how a manual can help a strugging user, I will relate my personal experiences with two training manuals that I wrote for two different audiences:

1. Supervisors and managers in a large MIS (Management Information Services) Department.
2. Employees in various departments, from clerks to managers.

ATTRACTIVE, USABLE DOCUMENTS YET LOW-COST

The manuals were written for use only in my company. Consequently, I expended much effort toward producing attractive, usable documents that were low-cost. I feel that I achieved this objective by using equipment and supplies that most data processing departments have.

I used a hand-operated lettering machine and a word processor to produce the titles and text which were written in simple, non-technical language.

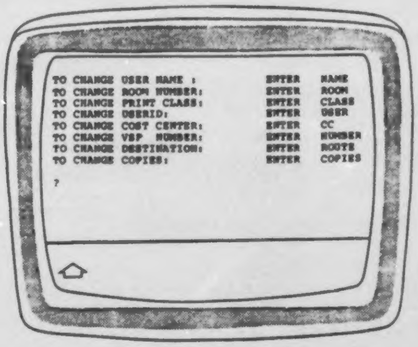


STEP 1 - Check your terminal.

- Be sure that the "A,a" button on your terminal is pushed in to the "A,a" position.

Figure 1. Title and Text

I also relied heavily on a terminal connected to our mainframe to print screen exhibits. Rub-on arrows showed where on these screens the user should enter data.



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TO CHANGE USER NAME :           ENTER    NAME
TO CHANGE ROOM NUMBER:          ENTER    ROOM
TO CHANGE PRINT CLASS:          ENTER    CLASS
TO CHANGE USERID:               ENTER    USER
TO CHANGE COST CENTER:          ENTER    CC
TO CHANGE VSP  NUMBER:          ENTER    NUMBER
TO CHANGE DESTINATION:          ENTER    ROUTE
TO CHANGE COPIES:               ENTER    COPIES

?
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Figure 2. Data Entry Location on Screen

The manuals were bound in three ring binders. One binder was preprinted with my company's name and included a set of tabs that were preprinted with Roman numerals. (Both the binder and the tabs were items that my company kept in stock.)

The other binder was a plain yellow one that was purchased from an office supply company. Instead of tabs, I used yellow stock paper to divide the major sections and titled these sections by using the lettering machine.

TRAINING MANUAL #1

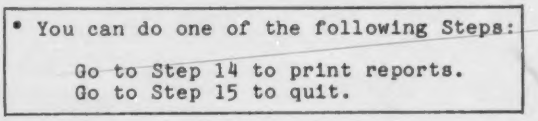
For the first training manual, I documented an online system that was designed in-house. The system allows MIS management to make monthly forecasts of their budget data.

Typical of the "fast and furious" method of analysis, design, development, and implementation of computer systems, this project was no exception. In fact, my involvement occurred only about one month before the management began entering their data. As the system was being designed, I documented it on a word processor, whirling my chair around to test the user commands and system responses on a terminal.

Although this system was designed for computer management, I included in my audience of potential users clerical support who assist in the budgeting process. Consequently, the manual was written in modules and organized as follows:

- **Overview**
- **Start:**
  Step 1 through Step 4
- **Load:**
  Step 5
- **Forecast:**
  Step 6 through Step 13
- **Report:**
  Step 14
- **Quit:**
  Step 15 and Step 16

Within each module the user was told what to enter and what the system response should be. Documenting the system using a step-by-step approach showed the user how to start and end the online session. I also explained in detail which steps to follow after completing each module.



• You can do one of the following Steps:

Go to Step 14 to print reports.
Go to Step 15 to quit.

Figure 3. Which Steps to Follow

The date of implementation approached, and I was put in charge of coordinating the training on this system. I set up a large conference room with yellow bound training manuals, yellow highlighters and pens. The Project Team attended and provided technical explanations about the system.

I asked the audience to page through the manual while I pointed out important features of the system. A few transparencies were used to allow discussion of how to enter the data. By the time this training was held however, most of the "training" had already been done because I had created a manual that told the user how to begin, continue, and end the task of entering data.

TRAINING MANUAL #2

This second manual is used by our training group in regularly scheduled classes to teach employees how to use a software product called Answer/DB. The trainers use the manual to supplement verbal instruction and hands-on terminal practice.

While designing the manual, I relied on the following sources for information:

1. the ideas I gained from attending a training class on Answer/DB.
2. the ideas of the trainers who tested the drafts of the manual in classes.
3. the vendor [illegible] manual, Answer/DB User's Guide. (1)
4. the technical advice of our product manager.

Before starting the documentation process, I attended a class to learn the product and to see how the information was taught. After this class, I wrote a Preface for the manual and a small section about one of the user commands. My objective at this point was to get the trainers' approval regarding the format I chose, which was different from most of the other manuals produced by my company's technical writing group.

I used the following format for each Answer/DB command:

- the definition of the command,
- the syntax of how to enter the command on the terminal, and
- several examples of the command.

The initial design was approved, and more and more pieces of the manual were completed and reviewed. To complement the unique format I printed the manual on 11" x 8 1/2" paper rather than on our usual 8 1/2" x 11".

The resulting "flip-chart" manual was organized into eight major sections:

Section I: This section provides a glossary of terms and an overview that tells step-by-step how to begin and end using Answer/DB. I also designed a quick reference page to show this sequential flow. (I had this page enlarged for the trainers to hang on a wall during class and refer to while teaching.)

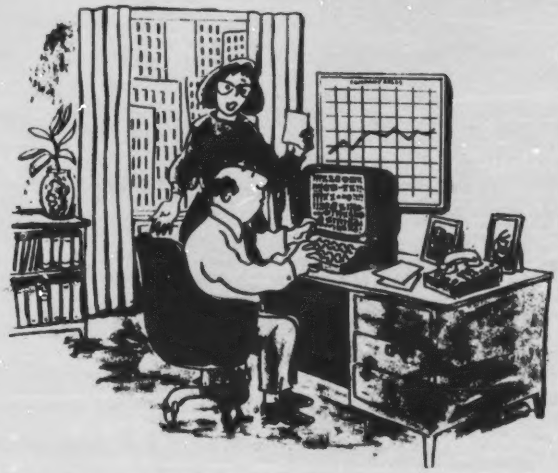
Sections II through VII: Each section has the definition, syntax and several examples of each command. After each command, I provided a problem for the user to solve. In this case, the manual serves as a workbook. A page is provided after each problem so that the user has the option to write down the solution before entering it on the terminal.

Section VIII: This section contains screen exhibits that show the solutions to the problems in the previous sections.

Within a few weeks, I had prepared the first draft. The draft was used in training classes to test its accuracy. By the time I produced the "final" document, I felt that I had written a useful manual.

CONCLUSION

In this paper I have not addressed the process of revising the manuals. Because of the way I designed the manuals (that is, a sequential flow of how to use the systems), revisions have been simple and have not posed a problem, except for the age-old "getting around to it." I am proud that these two manuals are still "alive" at my company, and I don't believe that the following situation must occur.



"The computer company says call the software company. The software company says call service. Service says it's not in the contract; it's in the training manual. And nobody understands the training manual."

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Word Processing for the Media

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Word processing is an all encompassing term that means different things to different people, not so much because of the differences in hardware and software, which in themselves are mind-boggling, but because of the myriad of uses to which word processing is applied.

Each of the three panelists has had extensive experience with word processors, but in different types of applications and work environments. They represent experience not only with different applications, but with the main hardware configurations -- from standalone and networked personal computers to multiterminals working off of one CPU to terminals tied into a mainframe. Taken together, the panelists' papers represent a cross-section of the potential of this computer-based tool for writers and editors.

Katherine Godby supervises the Manuals Administration Program at ARCO Oil and Gas Company, which oversees the production of some 250 manuals a year. When it became apparent that the system then in use was no longer being manufactured, the deparment began its search for a system that would meet more of its needs, based on its priorities matched against what was available on the market. The system chosen has some special features that make it particularly well suited to writing and processing technical, administrative, and procedural manuals written by people in various departments. One of the most important is its communication utility which supports point-to-point communications over leased or switched networks. Others are indexing capability and a list processing function that has eliminated the need for an antiquated card file system.

William B. Adams, a systems analyst with IBM Corporation in Tucson, Arizona, has a job at the other end of the spectrum. He develops text processing systems to satisfy the special needs of such groups as writers and editors. His paper, "Do It on the PC," describes the use of the IBM Personal Computer as a work station within a text processing system, using a large VM computer.

Thomas H. Brownell, Assistant Professor, Ferris State College Department of Languages and Literature, has a different message. His contention is that one of the most important advantages of word processing frequently is overlooked. This is its capability to allow the writer to view the written word as malleable -- something that can be rearranged, discarded, or replaced with different works easily and swiftly to achieve clarity of expression.

Word Processing in a Manuals Administration Program

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Abstract: This paper explores the search for a word processing system best suited to the needs of ARCO Oil and Gas Company's Manuals Administration Unit. It includes how the equipment is used in writing and processing technical, administrative and procedural manuals.

A list of requirements and options is included along with ratings for each option in terms of importance to the unit's work. Also discussed is the use of the equipment in the areas of word processing, communications, indexes, phototypesetting and an annual audit system.

INTRODUCTION

The Manuals Administration Program at ARCO Oil and Gas Company requires extensive and sophisticated word processing capabilities. The program administers over 250 manuals covering a wide range of subjects inherent to a natural resources company such as ARCO.

ARCO Oil and Gas Company is a division of Atlantic Richfield Company. The Manuals Administration Unit produces manuals for the Oil and Gas Company as well as other companies under the corporate umbrella.

NEEDS EVALUATION

The most compelling reason for obtaining new word processing equipment for Manuals Administration was that the equipment then being used was no longer manufactured. It was only a matter of time before replacement parts could not be found.

Requirements

Once the need was established, an evaluation began regarding exactly which options were necessary for the efficient operation of the unit. The supervisor and the staff met to discuss their equipment needs.

ARCO's Manuals Administration Unit is charged with the responsibility of development and maintenance of company manuals. The manuals cover such topics as accounting data classification, engineering technology, administrative procedures, gas plant operations, programming and data processing, and helicopter procedures and practices. The unit is responsible also for overseeing the development and use of company standards regarding manual format, layout and style. Based on these responsibilities, the Manuals Administration staff reached a concensus that the best equipment would be that which would:

- easily accommodate the unit's different formats
- increase productivity
- be user friendly

Ratings List

The supervisor drew up a detailed list of word processing options and features available on the market in 1982. The list evolved from the staff's own knowledge of word processing, the supervisor's contacts within the Association of Information Systems Professionals (AISP), and word processing literature.

Next to each option on the list was its rating in terms of importance to the unit's work (5 = most important; 1 = least important). Each option also was rated for its ease of use (4 = automatic or very simple; 1 = impossible or unavailable) which was determined in each instance by the vendor's equipment demonstration. The list was taken to each demonstration, and vendors were asked to specifically address each option not already covered in their demo. The requirements and ratings were as follows:

REQUIREMENTS	IMPORTANCE RATING	EASE-OF-USE RATING
Recalling pages	5	
Skipping over pages	5	
Search and replace	5	
Moving blocks of text	5	
Pagination	5	
File organization	5	
Index generation	5	
Table of contents generation	5	
Storage capacity	5	
Print quality	5	
Print speed	5	
Background processing	5	
Background printing	5	
Cursor positioning method	5	
Page scrolling	5	

Display highlighting	5	____
Underscore display	5	____
Super/subscript display	5	____
Print queuing	5	____
Revision and status reporting	5	____
Auto margin adjust	5	____
Page numbering	5	____
Headers and footers	5	____
Document merge	5	____
Delete capability	5	____
Sorting	5	____
Footnote tie-in	5	____
Storage medium	4	____
Dictionary/spelling package	4	____
Character pitch	4	____
First line forms advance	4	____
Temporary margins	4	____
Sheet feeders	4	____
Graphics	4	____
Revision indicator	4	____
Screen ergonomics	4	____
Bold printing	3	____
Line justification display	3	____
Default format statement	3	____
Glossary/learned keystrokes	2	____
Condensing text	2	____
Menus	1	____
Auto decimal tab	1	____
Greek symbols/equations	1	____
Control character printout	1	____

USE OF EQUIPMENT

The equipment that was chosen based on this study has a storage capacity of 80.4 megabytes on a rigid disk and an unlimited number of 13.4 megabyte removable disks for backup. It includes a communications utility and several advanced features such as list processing and sorting. Its use during the first year after purchase has increased Manuals Administration's productivity in several ways:

Word processing

The technical writers and the word processors who use the system regularly find the equipment easy and fast to use. It provides excellent editing capabilities including:

- Copy and move (both within and between documents)
- Search and replace (and global search and replace)
- Glossaries for learned keystrokes
- Paragraph files

Communications

Perhaps the best feature on the equipment is its communications utility which supports point-to-point, half-duplex communications over leased or switched networks. This feature has 2780 and 3780 emulation and a BSC protocol. With its menu-driven software, it is easy to learn and to use.

Many manuals are written by employees in other departments, and the documentation then is communicated to Manuals Administration for editing and word processing. The documentation is usually created on the mainframe computer. When the original writing is reasonably well done, this process greatly simplifies Manuals Administration's tasks.

The procedure for telecommunication is as follows:

> Communication from the host computer begins by obtaining the name of the data set in which the manual is stored. The author already has run the data set through a program that converts it from an EBCDIC into an ASCII code set. It is then a simple matter of inserting the data set name into a word processing (WP) document containing job control language (JCL). The telecommunications menu is accessed and the WP document is sent to the host via a specific connection designed for communications with the host, a TCB controller and a 2400 baud modem. The JCL instructs the host to bring in the data set to a previously designated remote site. When this is accomplished, the equipment assigns it a document number which appears on the telecommunications menu and which the editors then may access to begin the reformatting and other editing functions.

How easily documents can be edited depends on the quality of the original writing as well as the communications process used. Manuals Administration has established a procedure for all authors to use when writing manuals using the mainframe. The procedure walks them through the steps necessary to ensure an editable document through the communication process. If the author does not follow these procedures, many times it is actually easier for the word processing operators to rekey the entire manual rather than edit it. Reformatting can be a tremendously tedious and time-consuming process.

Indexes

Indexes can be created in two ways. The most common method used by Manuals Administration involves communications; the other uses an index generating capability within the word processing equipment.

Each of Manuals Administration's 250 manuals has an index created by entering keywords and page numbers into a word processing document. In the first indexing method, this document is separate from the document containing the manual. A Manuals Administration staff member reads the manual to enter the keywords. The document is communicated to the host computer by the means described above and run against a special indexing program. This program does several things to the document:

- Places leaders from the entry to the page number
- Alphabetizes
- Formats
- Separates the index into alphabetical sections
- Paginates

When the document is returned to the word processor, it is ready to print. This method places no limit on the number of entries, and each entry may be up to 80 characters in length.

In the second indexing method, keywords are entered at the end of the same word processing document containing the manual. The keywords are sorted via the equipment's sort utility. After sorting, an index generator function is accessed which searches for all occurrences of the keywords and places the page numbers on which the words appear in an index at the end of the document. An index created in this way may contain a maximum of 2,000 keywords, each of which may be 32 characters long.

Phototypesetting

Manuals Administration began phototypesetting certain manuals in the summer of 1983. The process is through communications to a typesetter installed in another Company unit. Phototypesetting greatly increases the time required to complete a manual for publication because special codes must be inserted and because coordination is required between Manuals Administration and the typesetting operator. In certain cases, however, time is not a crucial factor, and it is in these cases that the benefits of phototypesetting are evident. (These benefits include aesthetic improvement, increased readability, and job enrichment for the word processing personnel.)

Manuals Administration phototypesets a manual by inserting certain mnemonic commands into the text of each document and sending it to the phototypesetter using yet another communications connection.

Certain rules are followed when typesetting a manual. These include:

- Use italic or bold faces for emphasis instead of underlining.
- Do not set words in all capital letters.
- Use the bold faces for headings and subheadings.
- Use no more than three type sizes on one job. The three type sizes are normal text size, heading size, and subheading size.
- In setting tabular material, align all figures vertically on a common decimal point.
- Do not divide a word at the end of a line with a hyphen.
- Maintain a clear difference of at least two points between type sizes used together. Example: avoid using 9 point and 10 point together.

Audit System

As previously stated, many of Manuals Administration's manuals are written by employees (called manual coordinators) in other departments. These coordinators have ultimate responsibility for regular updates to their manuals. A consistent problem encountered is the neglect of this responsibility. To help eliminate this problem, Manuals Administration uses an annual audit system to remind the coordinators that an update is due.

The audit system begins with a complete online file containing the names of all 250 manuals, each manual's coordinator, the coordinator's location, and the date of the last revision. The file is located within the equipment's list processing function.

List processing enables Manuals Administration to selectively retrieve information from the audit file and to automatically create the memos reminding coordinators to update their manuals. It has eliminated the use of an antiquated card file system.

Information about each manual is entered into a separate field. The operator simply instructs the system to search the fields containing the last revision dates and to select those manuals not revised since a certain month and year. The equipment places each "hit" in a word processing document which then is merged with another document containing the previously prepared reminder memo to coordinators.

The process is easy and fast and has reduced the time required to complete this task from three days to about three hours.

CONCLUSION

This overview of word processing in the administration of a manuals program for a large corporation is indicative of the many uses of technology in today's office. Since the equipment described was purchased, the Manuals Administration Unit has already looked at and is considering the addition of several more new and exciting advances in word processing technology. It is, of course, a never ending process, and one that serves to make the technical publications manager's job always stimulating and challenging.

Planning and Implementing the Right Word Processing System

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Most commentaries by writers and writing groups who have switched from pads and pencils to keying-in text through word-processing systems lavish praise on the ease of adapting to the new technology and the increased productivity that results. The word processor is the first tool ever devised to complement the language construction process. As a writer formulates his thoughts on the CRT screen, the form of expression is easily and infinitely malleable. At the point when the writer is satisfied that he has expressed his message in clear form, the machine is also ready to produce a finished copy. Should the writer desire to revise or edit his copy, he can once again call his text onto the screen, and insert, change, or delete as desired. At the moment he completes his work, the machine once again is ready with a finished copy. The ease with which word processing allows writers to revise stands without parallel in its potential for improving clarity, style and readability of writing generally.

Yet, a word processor is only a tool. Just as a sculptor's chisel is an implement for carving beauty from raw stone, so too, in the hands of a trained writer a word processor becomes an instrument for molding words into clear communication. To achieve the full potential word processing offers, those responsible for implementing the technology need to plan carefully and select a hardware/software combination that is unobtrusive and easy-to-use. In addition, writers need to be reminded that writing is a fluid, creative process, and shown how the word processing tool enchances the writing task. Along with the positive effects, we need to recognize that physiological maladies can arise from ill-planned or poorly implemented word processing systems, and writers should be advised that letting the machine set the work pace can lead to a stressful working environment.

This paper details the planning steps managers, educators, or private users of word processing systems can follow to ensure that writers are able to use the tool to its full potential. It discusses pitfalls to be avoided, and examines the training necessary to avoid confronting writers with technology they are unprepared to use.

Pushing the GO Button

Many of you listening to this talk or reading this presentation may be asking, "When should I, the writing group with which I am affiliated, or my students, put aside our pads and pens, typewriters and white-out, and begin writing with a word processor? Is writing on a computer just a fad, like video games? I've heard word processors make it possible to write more in less time, but will they really make me a better writer? Besides these concerns, I really don't know what kind of computer to buy. Can I use a $499 discount special? And what kind of printer do I need? Does it have to print typewriter quality, or can I get by with dot-matrix printing? Maybe I'd better stick with my trusty Royal a little longer."

To the question, "When should I begin writing on a word processor?" my answer is an emphatic NOW! Yes, computer technology does speed the writing process. It eliminates the tedious rewriting necessary to produce clean copy. But more important, used to its fullest advantage a word processor can improve one's writing.

Did I hear you say, "Show me how." Okay, let's take a look at what happens in writing. Typically a writer begins by gathering information and assembling that information in some form or order. This process may occur mentally, or on paper. Then the actual work of fusing that information into sentences begins. During this procedure, most writers engage in dialogue with themselves. When all the information has found its way into sentences, a cursory proofreading, editing stage may follow. Then the writer, or a secretary, types a clean copy and for a time, at least, the job is finished. Unfortunately, this scenario leaves out the most important step, that of molding ideas as the writer conceives them into meaningful expression that you or I will understand.

To achieve clear communication, writers need more than grammatically correct sentences, more than knowledge of a communication model illustrating how information can be muddled through langauge; they need to render language — the medium of information exchange — fluid. To do so the writer must feel that a given piece of writing is malleable, that the order and expression of what has been written can be broken, rearranged, discarded, or replaced with different words representing different thoughts better suited to convey the original information to a total stranger. The discipline and effort required to achieve this fluidity of language using standard writing tools — pads, pencils, typewriters — thwarts many writers from achieving maximum clarity and an easily readable style. Besides, words on paper, whether printed, penciled, or typed, give an appearance of permanence that most of us are loath to break.

The computer changes all this. Words displayed on a video screen are merely light images that can be altered or erased by depressing a key. Instead of a writer's thinking to himself, "That sentence isn't right, but it's good enough. I don't want to rewrite this page again just to change that one sentence," a word processor invites revision. In a keystroke, the writer can alter his original construction, lopping off the end of a sentence, or finding that the ending actually contains the subject, pull it to the front, changing passive construction to active. A word processor works with the swiftness of one's mind. After alternative ways of phrasing have been tried, and the right combination found, pressing another key reassembles the paragraph in ready-to-print copy.

Reworking wording to achieve clarity isn't the only function of a word processor. Far from it. Let's say that reviewers of a document you've drafted complain that you've omitted important information. To correct the matter, you simply need to access the file (text) and insert the necessary content. In every way possible, a word processor makes language easily malleable. Editing, too, is a snap. With a word processor, lazy writers are more likely to correct their mistakes. As a result, lazy or not, our writing improves. In human history there has never been a tool as compatible to the ephemeral nature of language as the word processor.

In time, we'll no doubt be able to talk to the machines, but at current development, well-written software and personal-computer grade hardware designs are capable of improving the writing of anyone with passable typing skills. There's no reason to wait. That isn't to say it's not important to pick the right hardware/software combination. This step is critical to avoid being driven to the verge of insanity by the curse of trouble-prone equipment. The type of hardware/software combination will vary with the number of writers using the equipment, financing available, and other factors. The next section looks at three typical hardware arrangements and presents the list of essential and desirable software features.

Hardware and Software Considerations

One faces the question of planning for the right word processing system by appraising desired objectives, needs, and funding available. Perhaps the most common, and certainly least expensive from an initial-investment standpoint (the type of hardware most frequently installed by schools and smaller businesses) is the standalone microprocessor terminal. Today, virtually all personal-computer grade microprocessors provide the features required for professional word processing. These mandatory features include an 80-column screen, adequate memory to hold both the program and a sizeable text file, and for many, ability to run such industry-standard word processing programs as CP/M-based Wordstar. Desirable, but non-essential, features include a detachable keyboard and auxiliary key pad that can supply keystores for dedicated functions. Since standalone microcomputers are relatively low priced, an organization can start out with a minimal equipment investment and expand from there.

Larger companies and educational institutions tying their computer instruction to mainframe or mini-computers frequently provide word processing capability via on-line interactive terminals. In situations where the computer hardware is already in place, this approach may have a cost advantage. It can also bring additional benefits in file sharing, and uniform back-up procedures. Interactive terminals tied to a single central processing unit (CPU) and file base do present the disadvantage, however, that a mechanical malfunction of the central unit is likely to render all terminals inoperative.

For companies and institutions making a substantial investment in word processing hardware, there is a third alternative that combines elements of the two approaches already mentioned. It utilizes fully-configured microcomputers (capable of operating as standalone units) linked for file sharing by a Local Area Network (LAN) or other high speed communication to a central file base.

While finances may dictate the type of hardware your company or institution is able to purchase, the writing group's needs and objectives are key factors to consider when selecting the word processing software. Just as there are basic functions one would expect to find on a typewriter, so too, there are basic expectations to hold when evaluating word-processing software. Writers should be able to move backward and forward in their files at will. Since perhaps the single disadvantage of writing on a word processor is the fact that you can only see one screen of text (typically 24 lines of 80 characters each) at a time, you have to hold prior and subsequent pages in your mind while working in a given text location. In order to review these mental images, it is mandatory that the word processing software allow you to relocate anywhere in the text without having to exit the file.

Along with the backward and forward paging feature, the software must also allow you to insert, delete, copy and move single characters or blocks of text. It should allow you to search the text for designated words or letter combinations (called "strings" in computer terminology). In addition, the software should have a rejustify feature, meaning that when you attack a block of text by inserting or deleting words or phrases, the machine should reassemble the text for you at the press of a keystroke.

Besides these mandatory functions, other desirable features include the software's ability to recognize key commands activated by the terminal's auxiliary key module. In this way, single key strokes can replace multiple key commands for commonly used functions such as forward or backward scrolling, left or right pagination, and the like. In addition, many writers prefer to work with software that displays text exactly as it will be printed. Useful frills include a "swap" function that will transpose mistyped letters. For most writing it makes little difference whether the word processing software controls format design by rulers or embedded characters, but all writers find well-designed programs that minimize the number of keystrokes necessary to execute a given function far less tedious to use than those that don't.

The ability to link the word processing software to a spelling dictionary is also desirable. While spelling dictionaries do not, of themselves, eliminate all misspellings (most are unable to check names, for example) they are superbly useful in pointing out hard-to-recognize typographical errors and most misspellings. The ability to assist with indexing is also useful. However, where a specific index building capability is lacking, writers can use the standard search function to locate key words, thereby eliminating the tedious work of manually searching through pages of text to compile an index.

Above all, the software should protect the operator from inadvertently destroying files. For example, it should be impossible to trigger an abort or reset command by a single keystroke. And for most applications, security provisions to prevent file tampering should be provided. While on-line systems typically require a password to gain system access, file security should be maintained by those working on standalone computers as well. The method used can be as simple as requiring writers to lock file diskettes in a desk drawer.

Whatever type of hardware is used, the word processing program should have the capability of building files an indeterminate number of pages in length. Otherwise awkward patching will be required to construct lengthy papers. Schools, especially, are well advised to purchase industry-standard programs, rather than buy or copy someone's bargain-basement word processing software. There are two reasons for this: first, students should be exposed to software they are likely to encounter on the job; second, an industry-standard program is likely to provide all necessary features, plus most desirable options in well-designed, easy-to-use fashion.

Training Considerations

Selecting the right hardware/software combination is only one phase of the preparation required for successfully implementing a word processing system. All who will use the equipment, whether students, secretaries, members of the engineering and development staff, technical writers, whoever, need to understand the benefits word processing brings to them. While important, rapid input and lightening printing speeds are but minor gains in comparison with word processing's ability to hold words and ideas in a fluid state during the initial composing and later revision stages. No other mechanical device functions as compatibly with the human mind. But unless those responsible for acquainting writers with word processing explain the ease with which text can be altered to achieve maximum clarity, many users will consider the terminal and its software as little more than a video-typewriter.

Of course, some writers catch on to word processing's revision capability right away. These individuals may not have been the most productive writers in the group, but chances are they understood that writing involves grappling with words, as Ernest Hemingway once said, "to get the meaning right." For these men and women, writing on a word processor opens the door to striking advances in productivity.

To ensure that all writers use the word processing system to its fullest advantage, a series of short training sessions should be conducted. Typically, the initial sessions consist of explaining how to use the terminal and software, and include such basic instructions as backup procedures necessary to prevent file loss and a description of the key strokes required to input and revise text. Thorough operating instructions are important. All those using the word processing terminals will need some form of quick reference card containing function sequences, formatting commands, and diagram showing designated key locations. Marking these keys with keycaps will reduce training time. Along with the reference card, writers should have access to the word processing software operator's manual.

While these introductory steps are necessary to get writers going on the new equipment, it is far more important to demonstrate ways word processing can improve writing quality. Ironically, this is the step most often left out. Possibly the best way to illustrate how a word processor can help writers reorder their thoughts until their sentences ring with the clarity of glass, is to have a writer who is familiar with the word processing mechanism revise a selection of stiffly worded, confusing, or ambivalently expressed writing before the group. In many cases a workable sample can be taken from the company's own publications. After loading the sample text into the machine, the writer can point out in a matter-of-fact fashion areas lacking clarity due, perhaps, to awkward phrasing, inadequate information, or both. Using transparencies with a larger group, or working directly at the word processing terminal with smaller groups, the instructor can open up the text, break up longer sentences, eliminate trills of prepositional phrases and other extraneous constructions, insert needed information, and generally reorder the text into direct, declarative sentences. The instructor can then turn the terminal over to one of the participants and guide that writer's revision effort with suggestions from the group. A training session of this sort shows language suspended in a fluid state that allows the structure of writing to be molded for maximum clarity.

Along with explaining how to operate the hardware and software, plus demonstrating the ease with which text can be revised and edited, a third training step may also be necessary. In any group of writers, whether students or working professionals, not all will possess adequate typing skills. If these individuals are simply thrust onto word processors, frustration, lost productivity, and unwarranted stress are likely to result. The latter condition occurs most frequently with seasoned writers, many of whom lack efficient typing skills but are masters with pad and pencil, and pride themselves in their work. So that all writers can make a smooth transition to word processing, typing instruction should be provided to those who need it. Personal typing courses are commonly taught at business or technical colleges, and most high schools.

Besides providing the skills needed to use the word processor efficiently, training sessions should remind writers of the need to vary their activities in order to avoid spending large blocks of time in front of the CRT. For many, a computer has a mesmerizing effect, similar to that which video game addicts experience. The compulsion, felt by some, to feed the machine distorts a writer's pace and creativity, causing anxiety and related stress. Even after exposure to word processing, many writers still prefer to outline and draft on paper, then type their copy into the computer. Combining former practices with new helps many writers retain continuity in their writing activity and ensures time away from the machine. Managers should avoid the temptation to use writers for tedious formatting or imputting tasks that give writers the sensation of being used as machines themselves. Where strict format rules apply, managers should make sure that all writers, new staff members especially, understand these constraints. No writer should find himself in the stressful and thankless position of having to spend long hours needlessly reformatting his text.

Conclusion

Machines can be abused and abusive. In any mechanical environment, humans must be the master. Where writers fully understand the potential of word processing and enjoy the benefit of working with a trouble-free, well-designed system, the results will include not only increased productivity, but clearer, more readable writing as well.

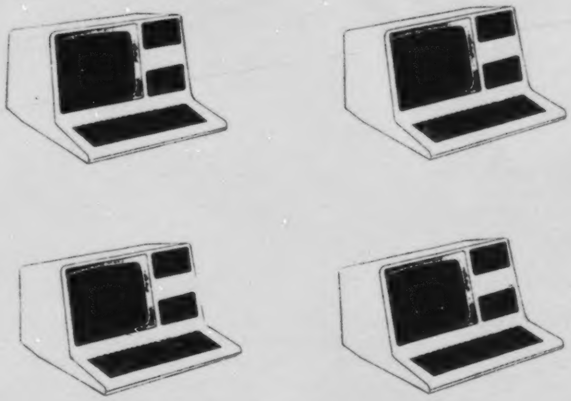

figure 1
Standalone microprocessors

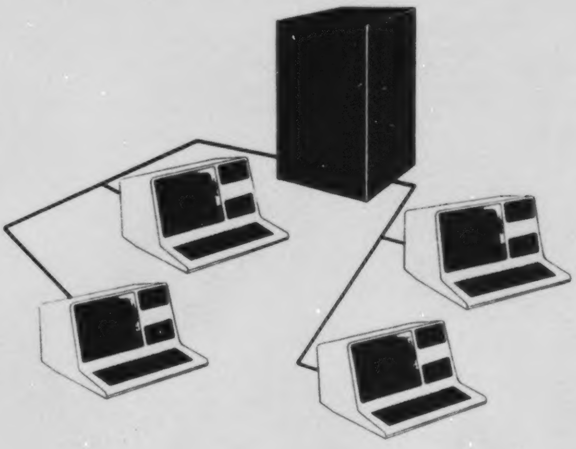

figure 2
Interactive terminals linked to a central computer

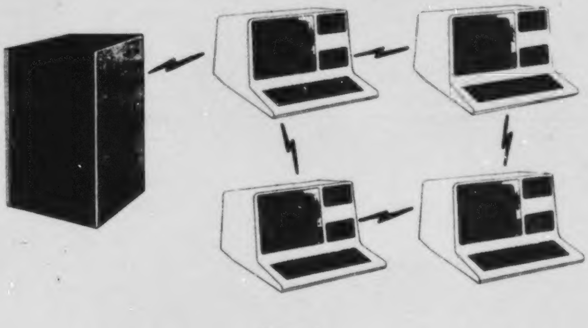

figure 3
Standalone terminals sharing a common file base

On-Line Documentation

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ABSTRACT

"A documentor 'should' possess that rare literary mystique, coupled with genius, intermixed with a deft dab of tact and diplomacy, permeated with saintly patience, and reinforced with an intensive and extensive knowledge of the entire field of communication. If he is also endowed with ESP and financially independent, it will serve him well. However, if reality must be considered, we could settle for much less; namely a person with the ability to organize and to clearly and accurately write a given document about a subject in which he is experienced and for a specific type of reader."

Richard E. Gunderman
DATAMATION, 1978

WHAT IS ON-LINE DOCUMENTATION?

All of us with some degree of frequency have had to "document" our work. The result is a document or physical evidence of our actions. Similarly, documentation can be defined as an act (the supplying of documents or supporting references or records) or the result of that act (a collection of documents on a given subject).

While, once upon a time, documentation only referred to the written or printed paper, today's computer age has added the electronic version of documents stored away as discrete bits of information in our computer. And if the documentation in the computer is instantly accessible from our terminal with its cathode ray tube, we call it "on-line" as contrasted with "off-line," stored away on floppy or hard discs, tapes, or even old-fashioned punched cards.

So much for definitions... except you may wish to keep them in mind as our panelists discuss better ways for you to write or document "on-line documentation" on-line.

THE CHALLENGE OF ON-LINE DOCUMENTATION

While on-line documentation for both reference and training purposes is making rapid inroads, many experts in the computer field contend that there still is nothing out there that beats a slick reference manual with a good index.

That, then, is the standard and the challenge for all on-line documentation: Is it always as accessible and easy to use as today's best paper manuals? Can I, the user, find the answer I need quickly and without fail? Or will I be bogged down with too many levels of help, frustrated by slow response time, and doomed by computer downtime?

To attack these deficiencies, promising new approaches in on-line documentation are being developed and applied. The three papers from this panel describe some of the leading-edge progress being made in his area.

In the first paper, Larry Gress and Victoria Ricciardi tell us "How to Write Better Software Manuals Faster." Their approach is computer assisted writing (CAW), and they will show how microcomputers can streamline the gathering and organization of manual writing.

In his paper, "On-Line Documentation: Good and Not So Good," Mac Katzin will illustrate and discuss the advantages of on-line documentation using HELP screens, programming comments, and reference materials. Interestingly, he concludes a viable combination of on-line and printed documents is needed for successful information transfer.

In the third and final panel paper, Jack Falk and Mike Nastos tell us to "Read Me First: Getting Ready to Design On-Line Documentation." In this paper, they describe the disciplines which eventually lead to several standards for on-line documentation in a publication environment.

Is documentation no further away than the HELP key on your terminal a dream or a reality? We invite you to come "on-line" in our audience discussion and decide for yourself.

On-Line Documentation: Good and Not So Good

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Documentation, for both reference and training, must be an integral part of any computer-based system. Having the documentation available right on your terminal, in video, is convenient, fast to use and makes for more efficient use of the computer. This paper discusses some of the advantages of "on-line" documentation - using HELP screens for input instructions, comments and reference materials. An examination of the hazards and limitations of on-line documentation is also presented. A conclusion suggests a viable combination of on-line and printed documentation for successful information transfer. Prospects for future capabilities using new technologies are mentioned.

If you're not already a computer user you're certainly a prospective user. Because of the fantastic growth in the availability and applicability of these electronic marvels, they are now as important as the telephone in terms of performing your job. To be sure, many of us have already been working with computers for years, but in a remote sense. That is, we handled forms and information that were eventually processed by a computer, and we often used reports that were generated and printed electronically.

Today, however, we have (or soon will have) our own personal computer at our desk, hooked into the corporate data bases. We have immediate input and output capabilities, and it is all immediately viewable on a CRT. If we have enough clout we may also have our own printer. We can use all sorts of packaged software, write our own programs if we like, and use programs written by our own data processing department. Work life is truly more productive and interesting.

As wonderful as all this seems - and it really is - we forgot to mention an important part of the picture needed to make all this progress happen. It's called procedures or instructions or user documentation. User documentation has always been needed (and hopefully was provided). Typically it was in a beautifully-written and well organized manual. Now, with our own computer on our own desk, we have some additional needs for documentation. For example:

- Because we have our own computer, we need instructions to operate it - which keys to press, how to correct errors, etc.
- We have many different software packages and systems available to us, and each has its owner user requirements.
- We need specific instructions for entering information into the new system.

Having our own computer gives us a terrific new medium for handling the documentation itself. Instead of the old printed manual we can have the documentation appear right on the CRT - on-line documentation. It is really efficient - we don't have to find the correct page in the manual and then go back to the computer to perform the action. It's all right there on the computer.

Furthermore, when the documentation is entered into the system's central storage facility it is immediately available to all the other users of the system. This way we have eliminated most all of the distribution problems usually associated with updates, new material, etc.

From the writer's viewpoint, we can create the documentation right on the computer, using any text or word processing software available, and then transfer it to a storage area (like a HELP file) with the press of a key or two. This eliminates all the printing, drilling, collating, binding, etc. involved in manual preparation.

Another advantage of on-line documentation is space. With the information stored electronically inside the computer we don't need additional shelf or drawer space for a thick manual (or two). And of course the stories of how much more information can be stored electronically compared to print are common and true.

All in all it appears that on-line documentation offers another new world of space-age information for the new computer user.

Figure 1 shows how the user sees on-line documentation. The bottom screen, with the asterisk rectangle, is the transaction screen being used. The user is entering information into this screen similar to the way information is entered on a paper form.

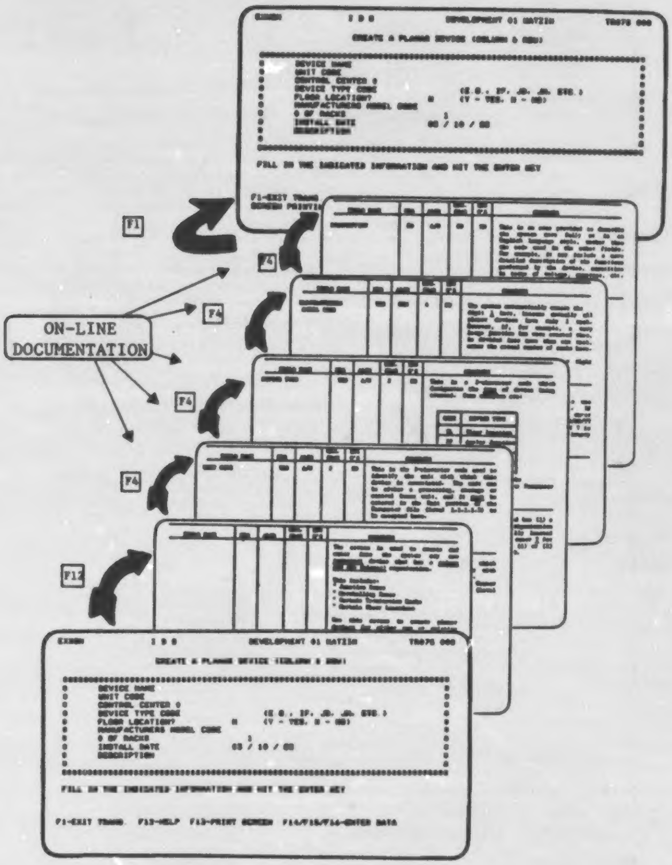


Figure 1

If the user needs some help in defining or knowing how to enter the data, he presses the HELP key. On this particular system HELP is the key marked F12, shown in the little box above the bottom screen. Immediately the first "page" of on-line documentation for this screen appears. If the first page doesn't have the help needed, he begins "paging" through the file of HELP pages (on-line documentation) for this screen. In this system the key marked F4 pages you forward.

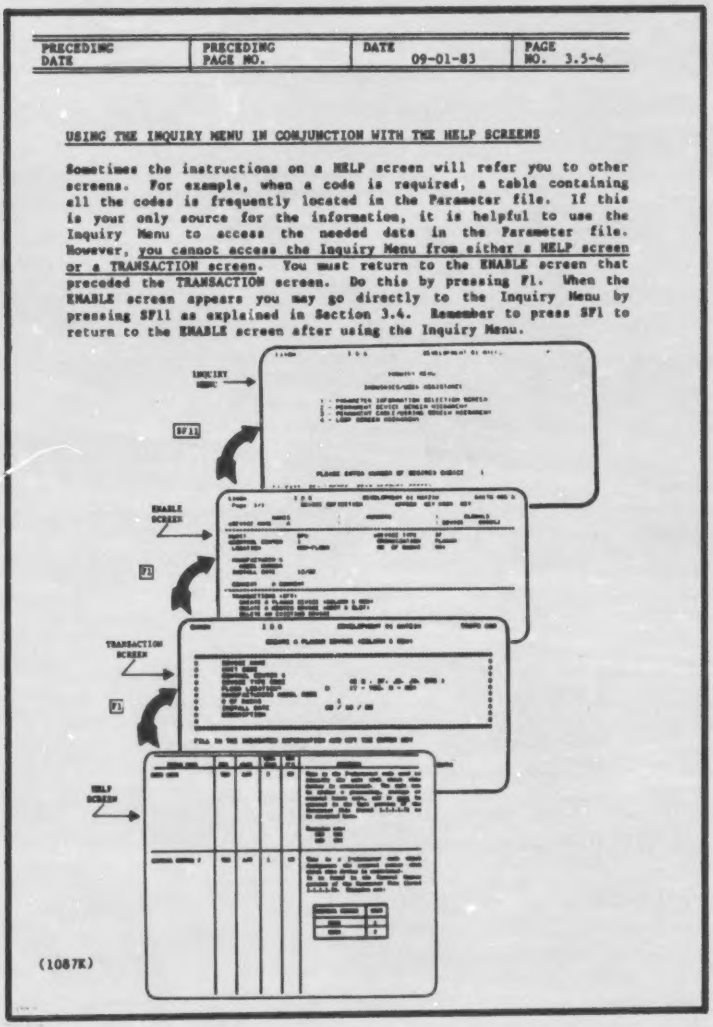
When the required information is found the user returns to the transaction screen by pressing another key - in this case F1 - and continues as usual.

Each transaction screen in the entire system has its own "personal file" of on-line documentation HELP screens, and it is available to all users at all times.

PROBLEMS OF ON-LINE DOCUMENTATION

As wonderful as all of this appears - and its truly is - there are some serious shortcomings from a documentation standpoint. For example:

- The user must know and understand how to "get around" within the system. Somewhere the user must learn how to get to the specific transaction screen to begin with. It is probably a process of choosing from one or more menus until the right screen appears. Instructions must be provided for the user to direct him anywhere in the system. This is usually accompanied with some graphic representation of the system, such as an organization chart. But those graphics often are not available on the system's software, so these instructions are generally in printed form.
- Going from the transaction screen to the HELP file, paging through the HELP file, and then returning to the transaction screen can be complicated and confusing for some users. Simple, clear instructions, often illustrated, must be provided here. Again the printed page is probably the best medium.



PRECEDING DATE	PRECEDING PAGE NO.	DATE	PAGE NO.
		09-01-83	3.5-4

USING THE INQUIRY MENU IN CONJUNCTION WITH THE HELP SCREENS

Sometimes the instructions on a HELP screen will refer you to other screens. For example, when a code is required, a table containing all the codes is frequently located in the Parameter file. If this is your only source for the information, it is helpful to use the Inquiry Menu to access the needed data in the Parameter file. However, you cannot access the Inquiry Menu from either a HELP screen or a TRANSACTION screen. You must return to the ENABLE screen that preceded the TRANSACTION screen. Do this by pressing F1. When the ENABLE screen appears you may go directly to the Inquiry Menu by pressing SF11 as explained in Section 3.4. Remember to press SF1 to return to the ENABLE screen after using the Inquiry Menu.

(1087K)

Figure 2

Figure 2 is an example of a page in a manual explaining how to get from a HELP screen to some other information, such as a table of codes. Notice how the combination of the text and graphics provides a simple, clear procedure to find the needed information.

- Usually introductions, system overviews and conceptual presentations are text-dominant - that is, they're not formatted like an input form or a record display, etc. Frequently they are enhanced by graphics. In most cases these sections are better presented in printed form rather than on-line. If these sections serve as "take-home" training material it is almost mandatory that they are printed.

On-line documentation requires special considerations in the system and program design functions. The documentation stored in the computer must be easily accessible to the user, and the procedure for "paging" through the information, both forward and backward, must be as simple as possible. The ability to "jump" from one set of instructions or data to another must be available and easy to use. Good planning is an absolute requirement here.

Three considerations are important from a hardware planning standpoint:

- Storage Capability - Ample file space (memory) must be provided for the on-line documentation. For example, you must allow for a sufficient number of HELP screens for each transaction screen.

- Hardware Functions - Function keys on CRT terminals are usually quite versatile and can be programmed to perform many different operations.

  It is important to have as many function keys as possible and to use them well; they are an important tool for manipulating on-line documentation.

  Printed output is always a part of any computer system. A printer operated by the terminal gives the user immediate use of reports and other hard copy and makes for more efficient use of the system.

- CRT Features - The size of the CRT - the number of characters and lines displayed - is an important consideration. It determines the type, format and amount of information available for each page of on-line documentation. Brightness control and/or color display are effective highlighting techniques, and they enhance the information shown on the screen.

It is important to understand, plan for, design and incorporate all of these considerations and benefits when on-line documentation is used. This means coordinating the efforts and skills of the user, the data processing specialist and the technical communicator.

The user must be involved, because he is, after all, the ultimate target of the entire communication. His job, required knowledge and skills, work environment, etc. must all be considered when determining how the documentation will finally appear.

The data processing specialist, probably a programmer/analyst, is critical because he is usually the link to the computer. He must create the files, pathways and linkages for storing, distributing and displaying the documentation on the computer system. He is an important part of the team that created the system about which the documentation is written. As such he is an invaluable source of technical knowledge to the documentation team.

Finally, the technical communicator, the writer of the documentation, should probably serve as the coordinator of all these functions for the documentation part of the project. Understanding the technical requirements, using graphics intelligently, creating the needed balance between on-line and printed documentation, merging the needs of all participants and maintaining an efficient and professional approach to the entire communicating project are the job requirments here.

Forecast

In looking forward it seems likely that on-line documentation will account for more and more of the instructions and procedures that accompany computers. Much of this will be because of the advantages just discussed. Other major reasons are the capabilities and refinements that will appear in video-text processing and the amazing potential of pre-storing information on micro-chips.

The use of "windowed" multi-functional CRT's and the new screens using neon and argon between two thin glass plates will probably add a whole new dimension to on-line documentation, particularly in the graphics area.

All of this provides a tremendous quantity of new tools for the creators and users of computer-based documentation. It also requires the creators and users to exercise a much more thorough planning job, which in turn calls for a broader technical knowledge of all the new tools and methods. Creativity, efficiency and better teaching and learning methods should certainly flourish in the new environment.

Word Processors and the Editor

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In this age of rapidly advancing technology, some communicators have already begun using the technology available, some are in the process of conversion, and some have not yet begun. As with any conversion to new methods, people have fears about what the new methods may bring and there are drawbacks to using the new methods. However, the needs for converting to the new methods may outweigh these fears and drawbacks and, eventually, people find ways to overcome the fears and drawbacks and even enhance the old methods that are not converted.

The members of this panel, Shirley Andersen, Reeta Garber, and Carolyne Zuttel, have all begun using today's technology to do their jobs:

- Shirley Andersen's paper, "The Impact of Automating a Publications System," adresses why communicators need to take advantage of today's technology
- Reeta Garber's paper, "Terminal Oversight: The Editor and the Word Processor," addresses how the fears and drawbacks of using today's technology can be overcome
- Carolyne Zuttel's paper, "Editing and Proofing Marks Adapted for Wang Word Processing," addresses how one old method, that of using proofreader's marks to communicate changes, was enhanced after conversion to a word processing system

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Editing and Proofing Marks Adapted for Wang Word Processing

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ABSTRACT

Standard proofing marks have not been revised since the days of hot lead type. As a result, a gap in communication exists between editor and typesetter-become-word processing operator. With the advent of word processing and its new symbols on the CRT, a revised set of proofing symbols is in order. This new set for Wang OIS introduces as proofing symbols most of the Wang screen symbols while retaining the best of the old symbols. Word processing operators recognize the new symbols immediately, and the results are more accurately corrected text.

YESTERDAY VERSUS TODAY

Publishing today is different than it used to be, thanks to electronics. What we used to write, rewrite, cut-and-paste, and edit only then was typeset. After typesetting, the story in galley form was sent to a proofreader who checked only the typesetter's work against final draft copy. The proofreader's function was limited to a check on the typesetter's work.

Today, authors enter themselves or have entered into a word processor a first draft. High-speed printers give us double-spaced draft copy more quickly than we can walk from the screen to the printer. We revise our first draft, have it printed, get it edited, have it printed, pass it around for review, incorporate review changes, have it printed again, and so forth until we (or time) decide "This is it" and send it to reproduction.

Thus, the symbols used for one very narrow specialist yesterday should be today the tools of

And what about the content of the corrections? That, of course, has changed, too. We are checking more than typographical errors. Rather than telling a typesetter to add lead, or to push down lead that prints, or to replace a broken or inverted letter, we are editing and rewriting. These changed requirements also are cause to amend standard proofing marks.

Another dramatic change is the actual hardcopy that must be proofed. Previously, proofreaders made their marks on galleys, acutal 8-, 10-, or 12-point typed columns printed on large sheets of newsprint, one column per sheet, allowing room in left and right margins for proofing marks. Today, we double space text and most often mark revisions to text between the lines.

PUTTING THE SYMBOLS TO USE

Considering the above, a final set of symbols must cover all circumstances without any chance for misunderstanding. The first requirement for the success of any set of proofing symbols is that both ends of the communication link agree on them. The collection here is the result of two teams of people, word processing operators and writer/editors, choosing symbols to convey common concepts. Since proofing symbols are a communication tool between two people, they will be only as sophisticated as the least of the two people. The symbols that we compiled into a 25-page guide to proofreading begin with the least sophisticated and increase to the more complicated. This permits new users--editors and authors--to develop progressively a vocabulary of symbols and clear directions.

OLD SYMBOLS BEST KEPT

We kept as many of the old symbols as possible. Of the nearly 40 that we finally agreed on, only 13 are new, and those come from the Wang screen itself. First on our list is the caret to mark the exact position of an edit. Secondly is the delete mark, which we use as the tail of a line drawn through material that is to be deleted. In the past, it was used only in the margin of a galley with deleted words circled.

Circling an item and marking the circle "stet" is how we delete an edit. (Editors and authors do change their minds.) The old symbol for spelling out an abbreviation is to circle the material; we retained that. Another item that we continue to circle is the period. We also circle "sic" in the margin beside a line to indicate to leave as is what appears to be an error.

We also kept the horizontal parenthesis for closing up space, and we lengthen it for closing up long spaces, again marking the material itself rather than placing the symbol in the margin. We also kept the paragraph symbol, but more from tradition than from logic since other symbols from the Wang screen would have been more consistent with our goal. We also kept the symbols for moving left, right, up, and down but use them directly on the text rather than in the margins. In a table of proofreaders' marks, these symbols resemble brackets. Using them directly in the copy permits extending the lines to mark exactly where the material is to be placed; this is especially helpful for tables. The parallel lines for aligning type also stayed with our new set of marks. By using them directly in the text, we again can be more precise.

We no longer use the old "tr" for transposition; we merely retain the marks that the hot lead proofreaders used directly on the type: a reclining "s" around the error. The triple underscore for capital letters we retained in the same fashion: without "caps" in the margin. The slash through a capital letter is for lowercase. Melding two paragraphs is done with a line connecting them.

WHAT'S NEW

We defined a backwards "Z" at the appropriate place in the text as the place for a line break. To prevent a line break (and here we introduce the first of the Wang screen symbols), a slash in reverse direction is, in Wang terminology, a command space. This is used to preserve on one line such things as "Mr." with a surname. To request boldface (we accomplish this on the Wang by printing twice over the same characters), we use an old technique: a squiggly underscore. For superscript we use a small arrow pointing upward under the digit; a small arrow pointing downward over a subscript. To indent, we place a small right-facing arrow in the left margin at the point indentation is to begin. To show the extent of material to be indented, a line from the arrow downward in the margin stops where the indent is to end.

To center material horizontally, we use a Wang symbol--a diamond shape. To center on the page, we combine the diamond with a page break symbol, which is best described as a vertical slash underscored. The Wang interprets this as "center on the page vertically."

Tabs are right-facing triangles. When an author knows the format line of the document with its tabular settings, the author can draw the required number of symbols to locate material exactly.

To have the Wang align a column of numbers by decimal point, we can request the decimal tab function. The symbol looks like a check mark that lies flat.

Vertical space on the Wang screen is indicated with a left-facing triangle. To insert a space or spaces, we draw one symbol for each line to insert; to delete, we draw the same symbol but with a delete mark through it. When your format is more than single space, the document will receive the equivalent of one carriage return for each symbol.

The last of the new symbols we use is for a space in a line, that is, a horizontal space. The Wang screen displays dots, a quarter the size of a period. To utilize this symbol can be aggravating and overlooked by the word processing operator unless the proofreader uses a wet pen such as felt-tipped. On the other hand, the dot (or dots), placed for visibility above a caret is a more efficient mark than the old pound crosshatch sign. The dot also can be squeezed into more limited space, especially handy when requesting two or more spaces.

NEW PROCESSES

The Wang offers expanded functions over old style typesetting that an editor, writer, or proofreader can request. Those that we list in our summary of marks include several functions, called glossaries, that we wrote into our own software, so they are unique to our company. Glossaries can be designed into a system quite easily. Those that we have include:

Gl-f for our word processing operators means that they can insert in merely two keystrokes two vertical spaces within a format of space-and-a-half (we double-space between paragraphs in space-and-a-half text).

Gl-t is for thesis sentence. In STOP proposal format and for other similar documents, text is both indented and single-spaced and then retracted in two efficient keystrokes.

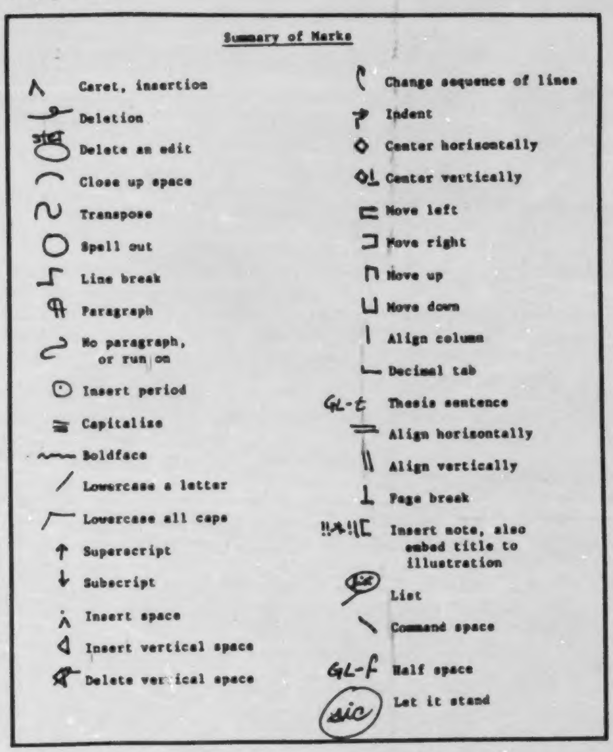
Another clever function is notes in text. By placing text between certain characters (we use !!*!![ ]), we can have auxiliary information on the screen but deleted from the text. On request to the Wang, you can choose to have your document print with or without notes. We have used this function during draft versions to list at the appropriate place in the text the titles to illustrations referred to in the text. Another instance was when preparing an index of abstracts of all documents produced under a single contract. We retained in notes on the Wang particular in-house information about the physical location of the documents and their peculiarities, information inappropriate for the customer but handy to the company.

In addition to symbols and glossaries, our guide to proofreading includes directions for instructing word processors to copy and relocate large quantities of text, something a hot lead type proofreader never needed. Precise directions are for moving text both within the same Wang document and between two documents, a document being all text accessible under one numerical address on the screen.

SPREADING THE WORD

The marks are only functional when both ends of the communication link are aware of them and agree to use them. Education most often becomes a task for word processing operators since authors in particular expect operators to comprehend what to them is perfectly clear regardless of the symbology. Although our in-house proofreading procedures are distributed as a handbook that includes directions such as formatting for sophisticated document design, we distribute a summary of the marks (see the illustration) on the back side of our word processing work requests.

Work requests are returned to authors with their printouts. Secretaries are eager to distribute them, too.



Summary of Marks

Caret, insertion
Deletion
Delete an edit
Close up space
Transpose
Spell out
Line break
Paragraph
No paragraph, or run on
Insert period
Capitalize
Boldface
Lowercase a letter
Lowercase all caps
Superscript
Subscript
Insert space
Insert vertical space
Delete vertical space

Change sequence of lines
Indent
Center horizontally
Center vertically
Move left
Move right
Move up
Move down
Align column
Decimal tab
GL-t Thesis sentence
Align horizontally
Align vertically
Page break
Insert note, also embed title to illustration
List
Command space
GL-f Half space
sic Let it stand

CONCLUSION

A guide to proofing that includes relevant symbols for authors, editors, and word processing operators can result in fewer misunderstandings as edited copy cycles through word processing. The guide can be negotiated much like a contract between editors and writers on one hand and the word processing operators on the other, and operators can augment standard requests by listing glossaries unique to their system. A guide that begins with the most elementary proofing marks and progresses to the more sophisticated requests also provides an educational tool. It can also serve to teach directing clear procedures such as marking large sections for "move" or "copy" and for formatting unusual documents. An index can help locate directions for particular circumstances, while a summary of marks can be widely distributed to serve as a ready reference.

Terminal Oversight: The Editor and the Word Processor

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ABSTRACT

The future tasks and roles of technical communicators have been the subject of recent speculations because of the increased use of word processing equipment for writing and editing jobs. These speculations range from the enthusiastically optimistic (writer/editors will become documentation managers, information specialists, and product developers) to the extremely pessimistic (word processors with the capabilities to spot questionable reading levels and excessive use of passive voice, etc., will replace writer/editors). Both viewpoints are narrow. The former ignores the many time-consuming administrative functions of technical communicators. Moreover, the latter addresses only copy editing functions--and even those from a limited perspective. Substantive editing is mostly ignored. This paper examines some major tasks and roles of technical communicators and ways in which each task will or will not be affected by word processors.

Continual advancements in computer technology and extensive use of word processing equipment by editors have provoked much debate and unease among technical communicators about their future roles and functions. Questions such as the following, asked at the 29th ITCC, illustrate this growing concern:

- "As the function [of editors] is changed what will happen to the art?
- "How will the functional change affect my job?"(1)
- "Must writing, editing, and other publications activities undergo some form of evolution in order to continue to form the basis for professional employment through the 1990's?
- "What new activities will best support continued professionalism?"(2)

Several assumptions seem to be implicit in these questions: (a) that word processors will ultimately replace technical communicators because of the machines' text-editing and text-analyzing capabilities (e.g., by preprogrammed readability formulas); (b) that the equipment's ability for quick and efficient composing and redrafting pose an occupational threat to the editor; (c) that an editor's major and most time-consuming task is one of copy editing; (d) that all other tasks will be easily accomplished by word processors. Consequently, the editor will become dispensable.

Needless to say, these questions and assumptions are hasty and ill-conceived; they fail to take into account the many other roles played by an editor: administrator, coordinator, researcher, and instructor. Often, these roles take up more of an editor's time than does actual editing. It would be absurd to assume that all these functions could be performed by a word processor, much less to conclude that editors will soon be a vanishing species. This paper examines the many editorial and administrative functions unique to a technical editor, and evaluates how each of these functions may be affected by word processors.

Editing functions can be categorized into five major units. Each of these units has more than one associated, inextricably linked administrative task. These tasks invariably define the roles that an editor is expected to play. The following breakdown elucidates these five units and the relative usefulness of word processing equipment for each of these tasks.

Editing Supportive Material

Supportive material consists of tabular information and illustrations (i.e., drawings, charts, maps, and photographs). An editor assesses supportive material for usefulness, completeness, and legibility--and estimates time and effort required for production. The assessment invariably includes editing table headings and figure captions, and also checking content and format for accuracy, relevance, and informativeness. The editor oversees the production of illustrations by graphic arts, while simultaneously editing the document.

The word processor can be used to evaluate and assess supportive material only in limited ways. For instance, an editor can write general evaluations of tables and illustrations on separate pages and send the writer a printed, hard copy for review. Separate evaluations are particularly useful for a general commentary and for suggestions for improvement. Conversely, when dealing with tabular information, questions and comments can also be made and inserted within brackets and parentheses on tabular material that is on disc. Again, a hard copy can be sent to the writer for consideration. How effective this method may be, as opposed to hand written remarks, would depend on the ingenuity and effectiveness of the editor's communications skills.

Since the editor is essentially serving as an intermediary between the writer and the production channels, administrative tasks associated with this unit cannot be performed by a word processor. The following preliminary functions require an editor's personal touch:

- Conferring with writers on the necessity, quality, and clarity of supportive material

- Instructing graphic artists on the kind and quality of product required and overseeing production

- Scheduling the document through various production channels, such as text processing (for initial keyboarding or incorporating corrections if there is no on-line editing), graphic arts (for preparing illustrations) composition (for producing camera-ready copy), and reprographics for (printing and distribution).

It is clear that these preliminary, administrative tasks require more time than that required for editing the supportive material itself. Whatever use the equipment is put to in this unit, its use is limited, even though some of its features can quicken and streamline an editor's work.

Editing Copy

This unit includes all copy editing functions described in the Chicago Manual of Style. The editor ensures that the conventions of capitalization, spelling, punctuation, and language usage are met. Technical information such as equations and tabular information in tables, charts, etc., is edited for consistency, accuracy, and correct format. Textual headings, table headings, and figure captions must follow the company's publication style. References are edited for complete information and accepted style.

Computer enthusiasts sing the praises of word processors that can copy edit text for: consistency; spelling; correct usage; format; section, paragraph, and page numbering; proper preparation of tables of contents; reference, figure, and table numbering; etc. It is obvious that these machines have eliminated a lot of drudgery. However, these functions have also outraged some critics, who blame the word processor indirectly for the ". . . sanitized but sterile technical publications" produced by editors who have been reduced to gazing ". . . happily at text-editing machines that are expected to do the editor's work."(3) They are equally perturbed by Bell Laboratories and its 23 available programs that can ". . . produce detailed editorial comments or brief summaries of submitted copy, and detect incorrect punctuation and spelling, over-long sentences, split infinitives, awkward phraseology and repetitive usage."(4) Pessimists conclude that such copy editing capabilities of machines are ". . . blurring the distinctions between writers, editors, compositors, and even printers--[and] may eventually make the copy editing function almost wholly mechanical."(5)

There is no doubt that the word processor is well suited for the task of copy editing. However, it is merely a tool that enhances an editor's work; it cannot substitute for an editor. The machine merely performs according to the commands given; it does not judge or evaluate. That is still the realm of the editor. Even copy editing is not always mechanical, but sometimes requires an editor's judgment. Language usage decisions (e.g., the use of passive voice instead of the active) require considerable care. Automatically changing a sentence into the active voice can produce grim, sterile prose that may also be inaccurate. The editor is still responsible for the fluidity of language and the report's content and meaning.

In general, the word processor can mechanically perform copy editing functions efficiently and quickly. It saves the editor time because the proofreading and corrections can be done on screen without a hard copy being printed and sent to a proofreader. However, the machine cannot communicate with writers to ensure the accuracy and quality of work. The following are some of the associated administrative tasks that a machine cannot perform:

- Conferring with writers about the accuracy of technical information

- Researching material to ensure that it is quoted correctly, or used appropriately, and that copyrighted material is attributed.

Editing In Depth

This task is the most challenging and time-consuming for a technical communicator. Also known as "heavy editing," "substantive editing," and "rewriting," this kind of editing involves reorganizing to achieve logic, coherence, and unity. In-depth editing can range from rewriting sentences for compactness, conciseness, clarity, and parallelism, to rewriting entire sections of a report for the same reasons. Word processors with their "move" and "copy" functions can speed the reorganization of entire sections of a report and quickly make iterative changes. They eliminate the need for hard copy markings instructing an operator to make corrections, as well as the need for a proofreader to ensure that the instructions were followed. This is the positive aspect.

The negative aspect is that the editor, without a hard copy to consult, is allowed to make a decision about moving major sections just once. If a paragraph has been moved to a new location in the text, and the flow of thought is still faulty, the editor without a hard copy to refer to may not remember the paragraph's original location. The same objection can be raised about the "replace" function. On a hard copy, an editor can rewrite a sentence or a paragraph several ways and can choose the best rewrite, or even go back to the original if the author insists.

On-line editing does not allow this luxury, and the editor usually needs to keep a hard copy of the original document.

In-depth editing on the word processor, as on hard copy, may not be as efficient as copy editing. In fact it is usually slower, because it requires careful consideration. It also offers no comfort to writers who question their editor's abilities and who look askance at an edited draft that has no red marks, thereby making it difficult for the writer to spot the changes. Because of the nature of the machine which always presents an uncluttered screen, the temptation to make unnecessary stylistic changes is always present. Therefore, editors need to take the writer's ego into account when the rewrite may change the writer's style completely. The document then becomes the editor's not the writer's, causing considerable consternation. On a hard copy, the editor can spot any inadvertent style changes; but on a word processor the deletion wipes out the original permanently.

Perhaps the word processor's greatest potential use in substantive editing is as a teaching tool. As mentioned before, substantive editing carries with it instruction duties: the editor instructs writers how to organize for clarity and write for coherence and unity. Therefore, editors can use word processors to generate different kinds of guides to help an author put together a well-organized report. Guides in the form of questions can be prepared for writing abstracts, summaries, and conclusions. Since these guides would be on discs, copies of these instructional discs could be given to a writer if there is no central computer system to which all writers and editors have access. This is one area in which the editor's role could evolve into one of instructor.

Administrative tasks for this unit are similar in nature to those of the copy editing function. Since substantive editing is iterative in nature, the continual dialogue with the writer is a time-consuming task that cannot be performed by the machine.

Preparing Copy for Production

This task involves marking the copy carefully and clearly for typography, column width, and layout requirements before submitting it to the composition group (assuming the document requires good quality reproduction) for production. The editor needs to ascertain that every detail has been taken into account and must be continually available for checking the document's quality in order to produce a well-prepared and accurate camera-ready copy.

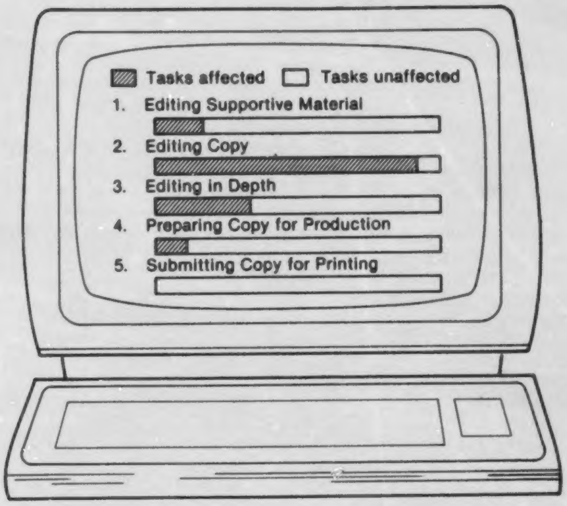
The word processor can be used to compose instructions that accompany the document to composition. The word processor is not a useful tool in any other way for the above editing task or the following associated administrative tasks:

- Coordinating the job to ensure that all groups involved in putting the document together communicate effectively
- Approving the camera-ready document and checking to ensure that it satisfies all internal and external publications requirements (i.e., policy and distribution statements, disclaimers, etc.).

Submitting Copy for Printing

This last task consists of submitting the camera-ready copy to the reprographics group with: (a) the requisite instructions on the type of printing, binding, paper size, weight, and color; (b) a pagination guide; (c) patent clearance information (if required); (d) distribution requirements. Obviously, the word processor is not useful in this primarily administrative unit, which also involves checking the printing quality before approving the document for release and distribution.

At this point, it should be clear that of the five editing tasks, only copy editing can be supplanted by a word processor. The following illustration exemplifies this point. Substantive editing will be only partially affected. Most administrative functions cannot be performed via a word processor. A word processor can never entirely replace an editor because an editor's ". . . job requires more than an ability to recognize and to repair poorly constructed manuscripts. To do a good job, an editor must also be a salesman, a teacher, a diplomat, a psychologist, and at times even a chaplain."(6)



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The Impact of Automating a Publications System

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Automating a publications system requires considerable adaptation while promising increased efficiency and productivity. This presentation discusses the impact of such a change on typesetters, technical writers, editors, and management.

INTRODUCTION

As the difficulties of processing growing volumes of input and output increase, along with heavy demands for fast turnaround times and data that require constant revision, more companies are contemplating the automation of their publishing departments. Federal Express is among those that have made the decision in the past two years to convert to automated publishing and writers' workbenches.

Beginning in August 1982, the Publishing Services Department of Federal Express produced a system specification and financial justification, sold the idea of automating to top management, bought and installed the hardware and software, and trained our people to use the system, which became operational in February of 1983. Thus our technical writers, editors, and typesetters have had to adapt quickly to this new environment. But before we look at the impact of automating, you should have some understanding of Federal Express's activities and their impact on our publishing environment.

COMPANY ACTIVITIES

Federal Express provides overnight, door-to-door delivery of packages and documents throughout the United States and Canada, using an integrated air-ground transportation system. It focuses on the highly reliable movement of sensitive, priority items such as computer parts, business/legal documents, etc. Currently, the company operates about 60 aircraft in a fleet that comprises six different aircraft types. Much of the maintenance is handled in-house, and expansion of the fleet occurs each year, often on short notice. Federal Express also operates and maintains about 5,000 radio-dispatched vans and trucks and approximately 200 types of ground support equipment, from deicers and loaders to containers and scales. At the center of the action is an automated facility called the SuperHub that utilizes nearly 20 miles of moving belts during sorting activities.

Each business day, couriers across the country pick up an average of 250,000 shipments destined for any of some 40,000 communities in the United States and Canada. The shipments are trucked to airports, where they are loaded on Federal Express aircraft. Following a hub-and-spokes pattern, the planes fly to the SuperHub in Memphis, Tennessee (most arriving between midnight and 1:00 a.m.). Packages and documents are sorted, then reloaded. Beginning about 3:00 a.m. planes leave the SuperHub at the rate of one per minute for the next hour, flying back to their points of origin with shipments destined only for those areas. Couriers then make deliveries of priority shipments by 10:30 a.m., completing the overnight, door-to-door cycle.

For this system to work successfully (which means having better than a 99 percent reliability rate), our people, along with the planes, trucks, sorting systems, and various other operations, rely on an extensive network of computers, telecommunications devices, and documentation of every kind. As Federal Express grows into areas such as international operations and same-day delivery of satellite-transmitted documents, the dependability of this communications network will become even more crucial.

PUBLISHING SERVICES ACTIVITIES

Publishing Services plays a critical role in the success of Federal Express's service. The department comprises three units: Forms Management, Corporate Publications, and Reprographic Services. Together, Publishing Services' 85 employees produce almost all of the company's corporate and technical publications (especially manuals). Like many of you, we work in the pressurized environment I mentioned initially—one of growing volumes of input and output, heavy demands for fast turnaround times, and a large, highly technical data base that requires constant revision.

In the past, we responded to such demands in traditional ways: overtime, increased staff, and increased use of outside vendors. Work was hampered by the time-consuming cycle of writer roughs, editor clean-up, keystroking, typesetting, proofing, corrections, writer review, more corrections, last minute changes, etc. We often were caught in a conflict between writers and production crew over quality control and priorities; there was fault-finding over typos and sloppy handwriting as well as time wasted in trying to locate jobs in process.

Although we didn't expect to eliminate such problems completely, we did see that adopting one of the newly available, automated systems would help us achieve four basic objectives:

- Increase the productivity of writers and production people by reducing or eliminating the purely manual functions of writing, illustrating, and layout.
- Increase our responsiveness to clients by reducing turnaround times.
- Eliminate costly dependence on outside vendors for overflow work.
- Establish the capability for receiving electronic (or machine-readable) data from other departments in the company as well as manufacturers—and for manipulating it automatically into camera-ready output.

CAPS SPECIFICATIONS

After developing a design specification for our Corporate Automated Publications System (dubbed CAPS), we carefully studied products available. The one finally selected combines Wang VS hardware and Informatics CSV software for input, processing, and output composition. The heart of the system is a Wang VS90 central power unit (CPU). The Wang and CSV operating programs reside on one 90-megabyte disk drive, while the publications data base resides on two 300-megabyte disk drives, each one capable of storing about 100,000 pages. A Wang tape drive loads new data onto the system and archives published data off.

To output data, we currently have five hard-copy devices: two Wang matrix printers used for general office word-processing output; a 600-line-per-minute Wang band printer to generate drafts for review and editing; a Santec printer, which allows us to review composed pages for less than one cent per page before we send them through the relatively expensive typesetting process; a Wang laser printer for camera-ready output of training and aircraft maintenance documents; and an Autologic APS Micro-5 phototypesetter, which produces most of our camera-ready copy. Additionally, an online photoprocessor from LogEtronics for the Micro-5 provides continuous paper feed and automatic paper-cutting capabilities. After installing a protocol conversion device that we later could not get to function correctly, we finally installed a Shaffstall device that properly translates and executes commands from the CPU. Completing the system are 27 Wang terminals: Six are used for composition, ten for writer workbenches, and eleven for administration and general word processing.

Presently, two of the six telecommunications ports on the CPU serve as interfaces with the company's IBM mainframe and Informatic's CPU in Maryland. The additional ports will be used for output devices (e.g., a laser printer in the Aircraft Workload Planning Department to print maintenance work cards stored on the system). In the future, we also plan to integrate with other Wang VS and OIS systems within the company, which will allow us to take full advantage of a distributed data base.

IMPACT ON TYPESETTERS

One feature that makes CAPS especially effective for us is that it runs against compspecs (composition specifications) developed by our compositors with the CSV software and command language. The compspec essentially governs page layout, thus allowing writers and word processors to concern themselves only with two tasks: accurate keystroking of text and knowing how to insert about ten basic page tags (i.e., commands tied to the compspec). Compositors then process the tagged data using CSV for final output on the Micro 5.

Initially, however, life was not this simple—especially for the typesetters. Even though we received excellent training support from Informatics, the typesetters moved from a relatively secure world of working with Compugraphic equipment to becoming programmers and system problem solvers, with increased responsibility for total system administration. We tried to lighten the task by establishing a Typography Standards Committee, which reduced our many, diverse page formats to about five basic types that are used for most manuals. Still, the typesetters had to overcome these obstacles, among others:

- Develop and test the compspecs, some of which run over 1,500 lines in length.
- Learn to work within the precise confines of decipoints instead of picas. (A decipoint is one-tenth of a point; there are 12 points to a pica.)
- Create methods for handling as easily as possible the large quantities of tabular data we process.
- Develop a management system that would maintain page integrity while allowing writers to access the data base.
- Develop and follow through carefully on backup procedures.
- Learn to manage various system failures, from power outages and software problems to head crashes.
- Learn to work within a controlled data-processing environment.

On the positive side, as writers learned tagging procedures from the compositors, both groups learned to work more cooperatively and developed greater appreciation for each others' efforts.

IMPACT ON WRITERS/EDITORS

As compositors load data onto the system, writers now can update it automatically. Using Wang terminal-desks (or workbenches), writers check out specific pages from the designated compositor for retrieval from the data base, make technical and editorial changes (inserting change bars as necessary), and initiate the production of review copies. Editors review the material either online via a terminal or in hard-copy form. Although editors still use pens for markup, a feature of the Santec printer that we plan to use in the future is that it can be programmed to distinguish between a writer's original input and an editor's changes by printing in different fonts. This eventually should increase editing at a terminal, thus saving a considerable amount of time and red ink.

Our writers, like all the people in Publishing Services, are excited about CAPS. Although only two of the writers had previous word-processing experience, training on the Wang, which was handled internally, generated contagious enthusiasm. However, the system created many changes for writers other than the need to learn simple word processing techniques and the joy of discovering how easily new manuals can be created directly on the terminal screen. Writers also have had to adapt in the following ways:

- Learn simple programming techniques in order to use a Wang glossary function that allows frequently used words or commands to be inserted easily as text is created.
- Use a spelling verifier and reading-level check—and, in the case of the latter, revise text appropriately to meet required levels.
- Use tags to translate word-processed files to typeset copy.
- Develop better time-management techniques to handle an increased volume of manual update and development.

Any anxiety writers felt originally about the safety of their data has been eased considerably by the backup and security measures initiated. There is security access to the entire system, a special security code for individual files (if desired), and automatic backup each night. Additionally, the three backup disks are stored offsite and are rotated daily to keep all copies current. Not much more can be done to prevent the agony of lost data.

IMPACT ON MANAGEMENT

Besides supporting the publication cycle, CAPS also supports administrative needs, from clerical word processing and production scheduling to management reporting. This January we initiated software developed in-house to schedule, track, and report on all elements of our work, from receipt of input data, printing, and distribution of revisions to final client notification of job completion. The Job Tracking System shows such information as the status of individual inputs and projects, employee time by task (both job and non-job-related), unit productivity, product cost, and vendor performance.

ASSESSMENT

At this point, although only about half of 300,000 anticipated pages reside on the CAPS data base, the automated system is proving to be a viable approach to increased writer productivity and reduced production turntimes. Our objectives are being realized, as our monthly output (measured in camera-ready pages) indicates: Page count has increased to about 4,000 pages monthly— nearly double that of the same period last year—while dependence on outside vendors for production overflow has stopped completely. In the next few months, we plan to make a decision on a graphics system to take advantage of our text-graphics merge capability. By summer, we plan to tie all of this together with a comprehensive data base management system that will complete our vision of a Corporate Automated Publications System, with the exception of demand printing and online microfilming, which will be reviewed next year. The ultimate goal, however, is to pursue the electronic presentation of corporate and technical information throughout the company, with remote printers available for paper copy when necessary.

The success we've had thus far with automation—and it hasn't come without problems (we've had three head crashes, for example)—stems directly from the support and positive attitude of our people. Today CAPS increasingly aids the efficiency of our production and promises even greater efficiency tomorrow. In the past 16 months, CAPS has required that all of our employees adapt flexibly and creatively, but the results indicate that the system helps to meet our objectives and increasingly works for us.

The DOCSYS/6670 Documentation System

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Texas Instruments' DOCSYS can produce a wide variety of documentation, including graphics. This comprehensive and sophisticated software system depends upon an IBM 6670 Information Distributor and interfaces to the TI 990 and IBM 370 operating systems. To perform documentation tasks, the user enters information in DOCSYS suboption panels instructing the User Interface to prepare the necessary Job Control Language. An integral part of the system is a LASER typesetter/printer and communications device with text-processing capabilities. The IBM 6670 can also produce single or two-sided copies, offset masters, transparencies, and copies of photographs.

1.0 Overview

The DOCSYS Documentation System is implemented on an IBM 4341 machine and on a User Interface System on the Time-Sharing Option (TSO). Users can enter information in various suboption panels to perform documentation tasks like these:

* **Formatters**

- COVER
- FOILS
- LETTER
- MEMO
- REPORT
- OUTLINE
- PAPER
- TRIP
- BOOK
  - ... TITLE
  - ... FRONT
  - ... GUIDE
  - ... INDEX
  - ... PRINTMAN

* **Utilities**

- CAPS
- COPY
- SPELLER
- SPELLMOD
- SPELLUP

The User Interface prepares the necessary Job Control Language (JCL) and executes the job. The process is like the following flow:

```
                  ______________________
                 |    LOGON ON TO       |
                 |   USER INTERFACE     |
                 |______________________|
                            |
                            V
                 |   MAKE EDITS AND     |
                 |   CHANGES IN A       |  <--------+
                 |   SELECTED FILE      |           |
                 |______________________|           |
                            |                       |
                            V                       |
                 | CHOOSE A PROCESSOR   |           |
                 |        AND           |           |
                 | SPECIFY I/O FILES    |           |
                 |______________________|           |
                            |                       |
                            V                       |
                 |   LOOK AT OUTPUT     |           |
                 |  AND ERROR FILES     |           |
                 |______________________|           |
                            |                       |
                            V                       |
                 < IS OUTPUT CORRECT? > ---NO---+
                            |
                            V
                 |  PRINT ON LASER      |
                 |     PRINTER          |
                 |______________________|
                            |
     _______________________V_______________________
     |          |           |          |           |
     V          V           V          V           V
 |        ||ONE-SIDED||TWO-SIDED||         ||         |
 | FOILS  ||  PAPER  ||  PAPER  || ROTATED ||UNROTATED|
 |________||_________||_________||_________||_________|
                            |
                            V
                        (  END  )
                        (_______)
```

Fig. 1--DOCSYS/6670 Documentation System

The **DOCSYS** formatters process a dataset containing text and appropriate commands, and output a dataset in the form of foils, a letter, a memo, a report, an outlined report, a trip report, and so on--depending on which type of output is specified. Datasets with sample input exist on the system so that users may copy a sample into their own dataset and edit it to modify the text.

On the User Interface, collection screens query for information and build a job deck suitable for printing data. Users enter the address of their 6670 LASER printer and can specify 1- or 2-sided output on punched or unpunched paper. For other documents like presentations, transparencies on film are even made by the 6670 LASER as part of a single job submission. Moreover, guides, generated by DOCSYS, are available worldwide by batch jobs requesting hardcopies at local LASER's. DOCSYS even reads instructions in the source of a dataset and prints out the necessary control language needed by the 6670 LASER to accord with the user's specifications. This formatting capability and the interface of formatters to a network of phototypesetters are the subject of this report. The system supports quick output, easy revision, and a variety of user-specified hardcopy styles at connected devices worldwide.

1.1 **Formatters**

* **COVER**
  The COVER processor reads a small set of commands in a dataset, and outputs a title page suitable for a report. Sample input and output datasets are available for users to follow. For users who want to submit their own batch jobs on an IBM system, the Job Control Language is very simple:

```
+------------------------------------------+
|//COVER   JOB                             |
|//  EXEC COVER,IN='...',                  |
|//  OUT='...'                             |
+------------------------------------------+
```

  Users show input dataset name in the IN='...' field. This is a dataset containing commands for a cover (like the model file mentioned above). The output dataset name goes in the OUT='...' field.

  The form of the input dataset is text and DOCSYS macros--or logical commands which the processor interprets as a cluster of instructions (lines to skip, spaces to indent, etc.). The output can be appended to a report for use as a cover sheet

* **FOILS, LETTER, MEMO, REPORT, OUTLINE, TRIP**
  These formatters process a dataset containing text and appropriate commands, and output a dataset formatted in the form of foils, a letter, a memo, a report, an outlined report, or a trip report--depending on which type of output is specified. Users can copy sample datasets and edit them as they wish for their input.

* **PAPER**
  The PAPER formatter processes a dataset containing text and appropriate commands, and outputs a formal article or report. It provides for automatic cross-referencing of tables, figures, examples, and pages.

* **BOOK**
  BOOK is a processor which reads the input file(s) containing the body of a guide and outputs all needed parts--title page, front matter, text, and index. The source for the body must be in the form of macro commands and text. A sample job deck follows:

```
+------------------------------------------+
|//BOOK   JOB                              |
|//  EXEC BOOK,PDS='...',GUIDE=A999999     |
|//                                        |
+------------------------------------------+
```

  '...' is the name of a partitioned source library. Users substitute exact report number, if known, for "A999999". Input is a member called "MASTER" on the PDS dataset. Outputs are members called "TITLE", "FRONT", "SET", "INDEX", and "GUIDE" on the PDS. The "GUIDE" member is the final formatted output, including the title, front matter, and index, though individual members for these parts are also generated.

* **TITLE**
  The TITLE processor reads a small set of commands in a dataset, and outputs a title page suitable for a manual. Sample input and output datasets are available on line for new users of DOCSYS. Input is assumed to be a member called "MASTER" on the input partitioned dataset; output is a member called "TITLE" on the same dataset. Output members are created by the system if they do not already exist, and previously-existing output members are overwritten.

* **FRONT, SET, and GUIDE**
  The **FRONT** processor reads the entire source for a guide and outputs a table of contents with sections and numbered paragraphs listed according to page number. It also generates lists of tables, figures, and examples. **SET** is a processor which reads the entire input for a guide and computes the correct numbers of pages, figures, examples, and tables. It may be run separately or automatically as a part of the BOOK processor. **GUIDE** is a formatter which reads the input for a guide, or any part of a guide, and formats it in a style suitable for a formal guide.

* **INDEX**
  The INDEX processor reads only the index commands inserted in the body of a guide, and outputs an index of up to three levels. The input is assumed to be the MASTER member on a partitioned dataset; the master, in turn, lists references to other members on the same dataset containing the source for the body of the guide. Output is a member called "INDEX" on the PDS dataset.

* **PRINTMAN**
  The PRINTMAN utility reads the output of BOOK (i.e., a formatted guide) and prints a final version of the guide containing headers and footers. The PRINTMAN program also checks the output from BOOK for correct paging and allowable characters.

* **CAPS or LOWCASE**
  The CAPS utility reads any data file and converts its alphabetic characters to upper case. LOWCASE converts data to lower case. Special symbols and numeric characters are unaffected.

- **COPY**
  The COPY utility reads a source dataset and expands any statements of the forms--
  ```
  /COPY USERID.NAME.TYPE(MEMBER)
  /copy USERID.NAME.TYPE
  ```
  The COPY utility writes out a dataset consisting of the material in the input, altered only by insertion of datasets referred to in such /COPY statements. If a dataset referenced in a /COPY statement does not exist, the program continues. Output then contains referenced files which do exist.

- **SPELLER**
  SPELLER is a utility which checks any kind of dataset for correct spelling, and outputs a list of unrecognized words and the "Fog Index" measure of reading difficulty. (SPELLER also outputs datasets for use with utilities SPELLMOD or SPELLUP, if desired; see below.)

- **SPELLMOD**
  SPELLMOD is a utility which allows users to increment their own dictionaries with new words, or to delete words already in their dictionary. Users first execute SPELLER, and obtain an output file containing a list of unrecognized words. This file may then be edited to eliminate misspellings and to retain only words which the user wants added to the dictionary. The edited file serves as input to the SPELLMOD utility.

- **SPELLUP**
  SPELLUP is a utility which corrects misspellings in a dataset previously checked by SPELLER. Users first execute SPELLER, and obtain an output file containing a list of unrecognized words. This file may then be edited by inserting the desired correction to the right of each entry. This edited file serves as directions to the SPELLUP program. SPELLUP reads these directions and processes a copy of the user's source; the original file checked by SPELLER remains intact, should it be needed.

2.0 How to Print DOCSYS Output

- **User Interface PRINT Panel**

  Mainframe IBM 4341 users can go to an option screen on the IBM/SPF User Interface. The screen queries for the name of the dataset to be printed and for the desired type of output. One query allows the printing of user's data directly on sheets of transparency film, ready for use in presentations. The User Interface then builds and submits the necessary batch job. Each time a user uses the PRINT panel, the LASER printer is reconfigured to run the job correctly.

- **User Interface HARDCOPY Utility**

  Users can concatenate at the top of their data a member of a pre-established dataset containing control language to the LASER printer. This control language instructs for these sorts of choices:

  ...1-sided output on three-hole punched paper
  ...1-sided output on plain paper
  ...2-sided output on three-hole punched paper
  ...2-sided output on plain paper
  ...Foils on 1-sided paper, no holes

  Next, the user goes to another option screen on the User Interface. There, collection screens query for information and build a job deck suitable for printing data. One screen requests the destination to which the user wants data sent for printing; here the user keys in the address of a 6670 LASER printer.

  Some other available LASER instructions allow users to ask for line numbers printed every nth line, and to request that printing begin on the nth page of the data.

Users may control the method by which a page is printed on the 6670 LASER through the use of IBM 6670 Operator Control Language (OCL). If the user sends no OCL instructions to the 6670, a default print set of OCL, defined by the system, is used by the machine. The default output looks as follows:

```
 ______________________________
| * holes   * on top *        |  |
|                             |  |
|                             |  |8-1/2 inches
| horizontal orientation      |  |
|                             |  |
|                             |  |
|                             |  |
|_____________________________|  V

 <------ 11 inches ------>
```

Fig. 2--**Default Paper Format from the 6670 LASER**

The output prints out horizontally, as shown above, if the user adds no OCL. Output prints vertically if the user adds the following at the top of the data--

```
,FONT 1 241 1
,PRINT 100
,END
```

The output then looks as follows:

```
 ____________________
|                    |  |
| *                  |  |
|   h                |  |
|                    |  |
|   o                |  | 11 inches
| *    vertical      |  |
|   l  orientation   |  |
|                    |  |
|   e                |  |
| *                  |  |
|   s                |  |
|____________________|  V

 <- 8-1/2 inches -->
```

Fig. 3--**Vertical Paper Format on the 6670 LASER**

3.0 Terminals and Keyboards

DOCSYS supports the use of 990 and 4341 systems which access the IBM/SPF User Interface. The terminals used with these systems are typically Texas Instruments 911's and IBM 3279's. The two are different in significant ways. These differences require "mappings" of the respective terminal keys in order to obtain matching printouts. Some of the differences between the 3279 and 911 keyboards include the position of the exclamation point key and broken bar key, and the presence of square brackets on the 911 but not on the 3279. Many type styles from IBM do not have all of these characters. Moreover, where a standard IBM type style contains such characters, these are mapped to various keyboard positions and print out unpredictably. To resolve these inconsistencies, TI has--

- Built fonts which contain all characters found on both the 3279 and 911 keyboards.
- Created a mapping of these characters to match the 3279, another mapping to match the 911, and a third mapping to allow 3279 users to obtain square brackets for vertical output.
- Created mappings for both horizontal and vertical paper orientations.
- Installed these custom fonts and keyboard mappings (called "character sets") on the IBM 6670 LASER machines.

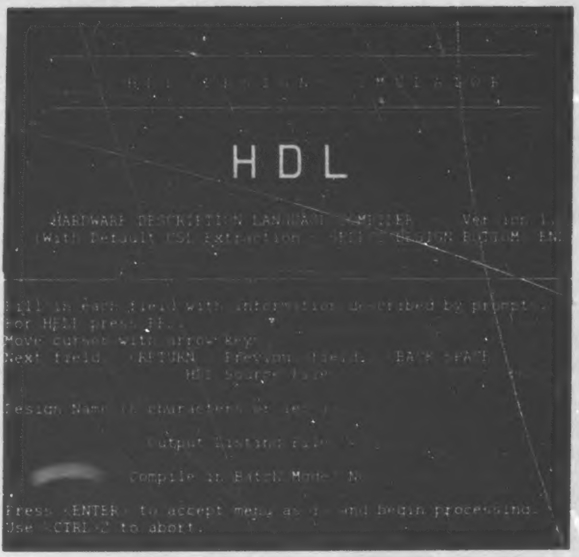
4.0 The LASER Printer

The IBM 6670 Information Distributor used in the DOCSYS system is a LASER typesetter/printer and a communications device with text-processing capabilities. In addition, it can be used as a convenience copier to produce single or two-sided copies, offset masters, transparencies, and copies of photographs. An optional 20-bin collator greatly enhances document production. As a phototypesetter, the machine formats its output in a choice of dozens of type styles; 10-pitch, 12-pitch or proportional spacing; and regular or bold-face type. Further formatting capabilities include multiple-line headers and footers, automatic page numbering, and margin and page length specifications--all of which can be stored on the machine for consistent text manipulation.

4.1 Creating Custom Type Fonts

With the aid of an IBM field-developed program called "FONTEDIT," the Texas Instruments Design Automation Department, together with TI's VHSIC Project Team, has designed a number of custom type fonts, standard graphic figures, and special character sets. The original need for these custom designs arose from the multiple operating systems and devices used by these two groups, and from the unique requirements imposed by these variations. For example, a user can input text from TI's 911 computer terminal, an ASCII code device, and be assured that the output will exactly match the input keyboard, in spite of the necessity for translation from ASCII to IBM6670 code points.

Another advantage offered by FONTEDIT is the design of type fonts for special applications. For instance, a custom white-on-black font to replicate a CRT screen produces effects such as the following:



```
[illegible]

HDL

HARDWARE DESCRIPTION LANGUAGE COMPILER    Version 1.
(With Default CSL Extraction - SPLIT DESIGN BOTTOM  EN

ill in each field with information described by prompts.
or HELP press F1.
ove cursor with arrow keys.
ext field: <RETURN>  Previous field: <BACK SPACE>
                  HDL Source file

esign Name (8 characters or less)

             Output Listing File

           Compile in Batch Mode: N

ress <ENTER> to accept menu as is and begin processing.
se <CTRL-Z> to abort.
```

Fig. 4--Use of White-on-Black Font

The oversize letters in the heading of this screen are also part of a custom font of TI's own design.

Several steps are involved in the design of such special type fonts:

a. Run a program called "FONTPREP" to read a dataset containing an existing font and convert it to an editable file.

b. Using a text editor, modify the file in accordance with the design. For the white-on-black font, change all the blank spaces, which the machine reads as white dots, to asterisks, which translate as black dots; then change the asterisks to blanks. This process, of course, requires a text editor that can make global changes.

```
01                           ****
02                           ******
03                           ********
04                           *********
05                           *********
06                              *******
07 *******    *****                *****
08 *******    *******               ****
09 *******    ********              ****
10 *******    *********             ****
11 *******    **********           *****
12                 *******         *****
13                   ******     ******
14                    ****************
15                     **************
16                      ************
17                       **********
18                         ******
19
```

```
01**************************    ****************************
02**************************      **************************
03**************************        ************************
04**************************         ***********************
05**************************         ***********************
06*****************************       **********************
07*       ****     **************     **********************
08*       ****       *************    **********************
09*       ****        ************    **********************
10*       ****         ***********    **********************
11*       ****          *********     **********************
12****************       ********     **********************
13******************      *****      ***********************
14*******************                ***********************
15********************              ************************
16*********************            *************************
17**********************          **************************
18************************      ****************************
19**********************************************************
```

Fig. 5--**Steps in Building Black-on-White Font**

c. Run a program called "FONTPOST" to read the edited file and reconvert it to a 6670 font.

4.2 Graphic Designs on the LASER Printer

FONTEDIT also allows the design of graphic illustrations for use in documentation. Very intricate designs are possible, as shown in this example:

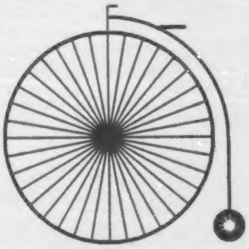


Fig. 6--**A Complex Graphic Using FONTEDIT**

One of VHSIC group's major uses of this graphic design capability is a template of commonly-used flowchart symbols that can be manipulated within the text of a document. Another application is a template for electronic circuitry symbols; e.g., AND, NAND, OR and NOR gates:

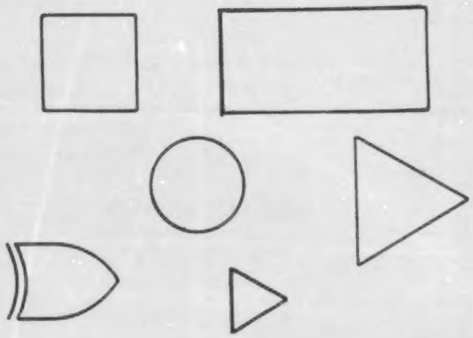


Fig. 7--**Circuit Symbols from FONTEDIT**

Output of the foregoing graphics is controlled by a command file that contains either a series of line vectors, called a "draw array", or a group of arcs, arc radii, and straight lines, called "command language" mode. The intricate bicycle in the first of the foregoing figures was created by the first type of file (draw array); the logic gate and flowchart symbols in the second figure were created by the second type of file, (command language mode). Part of the latter command file is shown in the following list:

```
*Line describing top of AND gate
1 4 480 1360 600 1360
*Arc describing front of AND gate
0 4 80 600 1280 270 90
*Line describing bottom of AND gate
1 4 480 1200 680 1200
*Line describing back of AND gate
1 4 480 1200 480 1360
*Arc describing top front of OR gate
0 4 160 560 960 30 90
*Arc describing bottom front of OR gate
0 4 160 560 1120 270 210
*Line describing top of OR gate
1 4 480 1120 560 1120
*Line describing bottom of OR gate
1 4 480 960 560 960
*Arc describing back of OR gate
0 4 170 340 1040 210 30
*Extra arc for EXCLUSIVE OR gate
0 4 170 300 1040 210 30
*Line describing top of LARGE INVERTER
1 4 840 1080 1080 960
*Line describing bottom of LARGE INVERTER
1 4 840 840 1080 960
*Line describing side of LARGE INVERTER
1 4 840 840 840 1080
*Arc describing LARGE CIRCLE
0 4 100 960 720 0 360
```

There is a choice of line types for graphics created in draw array mode:

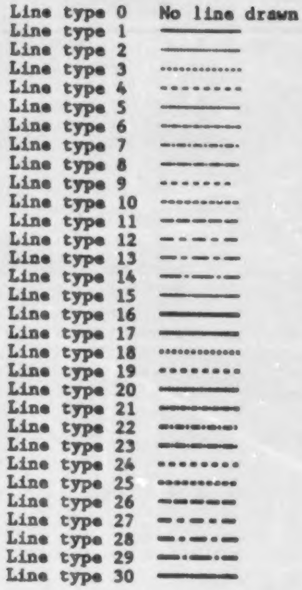

Line type 0 No line drawn
Line type 1
Line type 2
Line type 3
Line type 4
Line type 5
Line type 6
Line type 7
Line type 8
Line type 9
Line type 10
Line type 11
Line type 12
Line type 13
Line type 14
Line type 15
Line type 16
Line type 17
Line type 18
Line type 19
Line type 20
Line type 21
Line type 22
Line type 23
Line type 24
Line type 25
Line type 26
Line type 27
Line type 28
Line type 29
Line type 30

Fig. 8--Line Type Graphic

The combined capabilities offered by DOCSYS and the LASER printer have already streamlined document production in both the Design Automation Department and the VHSIC Design Utility group. Both are confident that the methodology currently under study will improve the output even further.

Advanced Technology for Graphics Support

Constance Fukuda, Moderator

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As the amount of time and money spent on producing manuals increases, many companies are examining how to reduce these costs by integrating the writing and illustration processes. The answer to this problem is a computer system that not only sets type, but allows the user to design page layout and create technical illustrations easily, quickly, and inexpensively.

The three papers presented in the Advanced Technology for Graphics Support session focus on ways to use computers for illustrations, phototypesetting, and page layout. In their presentations, the speakers will explain how computers help reduce time, labor, and cost. To present a realistic picture of this situation, however, the speakers will point out both advantages and disadvantages of using computers for technical illustrations.

The following technical communicators are presenting papers in this session:

- Joanne C. Izbicki
  Senior Technical Writer
  Lexidata Corporation
  Billerica, Massachusetts
- Gary M. Gatien
  Manager, Publications Department
  Environmental Research Institute of Michigan
  Ann Arbor, Michigan
- David L. Buie
  Research Technical Writer
  Halliburton Services
  Duncan, Oklahoma

Each speaker is highly qualified to discuss the topic of graphics support, having studied and used computers for typesetting, page layout, and illustrations.

After listening to the speakers in the Advanced Technology for Graphics Support session, technical communicators will learn about the advantages of using a computer-aided design (CAD) system, producing type and creating graphics on a phototypesetter and photocompositor, and producing artwork with a word processor.

This session will be particularly useful for those technical writers, editors, and illustrators who are responsible for the total production of manuals. Technical communicators who attend the Advanced Technology for Graphics Support session will gain insight and understanding of how to use a computer for the overall production of a manual.

CAD: What It Means to a Documentation Department

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Computerizing the technical illustrator's job can be a mixed blessing. Faster turnaround times and increases in throughput may not be enough to justify the purchase of a CAD system for the normally tight budgets that documentation departments have. This paper gives examples of the effects a graphics system can have on the documentation department, especially in the areas of cost and personnel.

The very nature of technical publications is iterative: we are constantly revising and building on what we had before. Traditionally, most of the emphasis has been placed on editing text rather than art. But now, with the emphasis on ease-of-use and user-friendly documentation, more attention is being paid to technical illustrations: drawings, photos, and illustrated procedures.

Just as text processors have revolutionized the technical writing process, computer-aided design (CAD) systems can play an important role in the advancement of technical illustration.

How?

- The tedium of retracing line drawings to effect a minor change can become a thing of the past
- Because the new CAD systems allow illustrators to change drawings quickly and easily, there will be faster turnaround time
- This faster turnaround time will erase the bottleneck that inevitably occurs near press time because of the time-consuming task of manually changing an illustration
- Faster turnaround time, then, means faster throughput
- Even last minute pre-press changes in illustrations may not impact production schedules as significantly as they have in the past
- More creative jobs can be accepted by the technical illustrator
- More graphically demanding assignments can be assumed by the documentation department

From the sound of these benefits, no documentation group should be without a CAD system, right?

Well...

ISSUES

Although the cost of producing line drawings on a video display terminal screen has dropped significantly, the cost of printing these drawings on plotters or printers is still very high.

Retraining illustrators in the use of graphics systems is time consuming (and thus expensive). Can a busy documentation department afford this training time?

And what about the time: time = cost! The time it takes for the technical illustrators to redraw all the illustrations in all the documentation to establish the data base of technical illustrations is not insignificant.

The cost of buying graphics equipment and maintaining it has put these systems well out of reach of most publications departments. Even with several illustrators sharing one graphics terminal, cost remains high because of a decrease in throughput. Under a manual illustrating system all illustrators, theoretically, are working at all times, In a 'sharing' environment one illustrator is, theoretically, working while the others are waiting for their turns. Non-productivity translates to increased cost. The solution would seem to be one terminal per illustrator (for input and manipulation) and one plotter shared among all illustrators.

Routine maintenance of the graphics system can most often be scheduled during slow periods. But what happens when the system breaks down? None of the illustrators can work and these delays increase the cost of publication.

Graphics processing requires large amounts of computer processing resources. Documentation departments are normally running full capacity word processing packages on their systems. The addition of a graphics capability could force an upgrade (upgrade = cost) or the purchase of another system compatible with the graphics system (another system = cost).

To look at the presence of a CAD system in a documentation department at a more personal level, what effect can there be on the technical illustrators themselves?

Their jobs change. Their art must now become computerized. Mechanical drawing has become computerized drawing.

The distinctions between the technical illustrator and the drafter will become blurred. Now that the drafter and the technical illustrator both use the same equipment to produce both blue prints and illustrations, job titles and job descriptions will become fuzzy.

The road to advancement will open wide, but only for those who are able to change with and learn from the technology. George A. Magnan writes that "Knowledge is the base for adapting to revolutionary technological changes...knowledge coming from training rooted in the intensive study of the arts, graphics, and design." The foremost criteria for graphics system operators is a high level of enthusiasm for learning the new technology. The new CAD systems are for those who are not satisfied with the old methods. This leaves illustrators in 'comfortable' positions in a rather precarious situation.

RECOMMENDATIONS

As mentioned earlier, graphics systems are expensive to buy and to use. Clearly, until the cost of these systems decreases and they come within acceptable price ranges for documentation department budgets, manual illustration will continue.

Other systems are beginning to evolve from attempts at integrating text processing and graphics. CAD systems still require manual paste-up of illustrations. To automate the entire process of technical publications, some systems have been developed that can manipulate both text and graphics on a screen at the same time. These systems (called electronic technical publishing (ETP) systems) allow editors to relocate text on a page, move the illustration taken from the illustration data base anywhere on the page, and scale the illustration. Editors are able to employ what-if techniques to obtain on the screen exactly what the final printed page will look like.

BENEFITS

Once the illustration data base is established, the decrease in time spent on modifying illustrations means that more illustrating jobs (even more challenging illustrating jobs) can be accepted and completed.

ETP allows the writer to concentrate more on the text without the worry of keeping in mind the placement of the illustration. Editors' jobs will be enhanced by the ease with which they can determine page layout: it will not be so time-consuming, and will require less guess work to visualize the final document.

ETP systems are the ideal. If documentation departments wish to go one step beyond text processing and are able to increase their budgets by only a small amount, then graphics systems for the illustrators seems to be an attainable goal. The super-systems that merge text and graphics, although not futuristic, will remain for the time being in the realm of high volume technical publications groups with uncommon budgets.

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Phototypesetters/Photocompositors: Versatile, Multipurpose Computers for Artists and Illustrators

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Too often, artists, illustrators, and department managers overlook the advantages of the phototypesetter/photocompositor as a graphic arts tool. This is due in part to vendor representatives who stress use of their equipment as text processors. This vendor approach sells both the user and the equipment short.

Especially with today's digital phototypesetters/photocompositors, illustrators can create not only good looking type, but also graphs (everything except the curves themselves), complex tables, and bar charts. They can also layout and design entire pages of copy. This capability, when coupled with the savings possible by using the equipment as a text processor, may be enough to cost justify a "significant" investment (say $30 to 50K) in only one to three years.

In addition, the high resolution, high quality output of the equipment enhances its value as a multipurpose tool. When an artist or illustrator is preparing art work to be printed rather than projected onto a screen, investment in a phototypesetter/photocompositor is more attractive than investment in a special purpose equipment such as a computer graphics terminal and slide maker. Of course, since the output of the phototypesetter/photocompositor is high quality, it can be copied and made into slides and viewgraphs as well.

INTRODUCTION

If you've ever considered purchasing a phototypesetter/photocompositor, the sales representatives have probably tried to sell you the equipment based on how much money you can save by doing your own phototypesetting (rather than having a vendor do it for you), how much time and money you can save by not having to rekeyboard the text for input to the phototypesetter, and how much money you can save on paper and other materials. For the most part, their claims are reasonably accurate. And if you have enough typesetting done out-of-house, or if you work exclusively with text, especially with volumes of text, their sales pitch may be enough for you.

However, these multipurpose computers offer a wide range of other capabilities as well. This is especially so in the area of technical illustration. Unfortunately, the sales representatives are usually uncomfortable talking about these capabilities because they are not familiar with them. (They need to be "reprogrammed.") However, if you, as a technical illustrator, artist, or department manager understand the needs of your customers and the printing and production process, you may find that these computers can be one of the most important tools available to you.

SAMPLE FIGURES PRODUCED ON PHOTOTYPESETTERS/ PHOTOCOMPOSITORS

Most small to medium-sized corporations, research institutes, etc., do not produce enough four-color brochures and color presentation materials to make investment in high quality, sophisticated, $100,000 to 500,000 (or more) computer and engineering graphics terminals feasible. What they do produce a lot of, however, are figures, tables, equations, and just plain words, such as the examples shown in Figures 1 through 5. (My experience has convinced me that many people do not associate "graphics" people with the production of words and equations. To them, artists produce only figures.) While examples such as these are sometimes copied and reproduced as slides or viewgraphs, they are more often printed in reports, manuals, annual reports, brochures, flyers, and a variety of other documents. In many cases, these figures represent the heart and bulk of technical illustration.

TIME AND COST CONSIDERATIONS

No matter how attractive a phototypesetting/photocompositing computer may be, a technical illustrator or department manager probably will not be able to purchase one unless (s)he can demonstrate time and/or cost savings. The advantage of this particular equipment is that these savings not only occur as the copy is being created, but also throughout the chain of printing and production processes.

For example, Figure 3 took 10 hours of an artist's time to complete using drawing board, T-square, type set on 35mm film strips, etc. With a phototypesetter/photocompositor, the copy was set in place, proofed on the CRT preview screen, and printed in under 1 hour. Figure 2, which was done by a more experienced computer operator than the person who did Figure 3, was done in 20 minutes. Figure 1 was done by an inexperienced operator (a salesperson) and also took about 20 minutes. How does that compare with the production time you are now spending on similar jobs? Each of the figures was done on equipment from different manufacturers. These kinds of savings in production hours not only enable illustrators to lower their cost per job, but also to take on more jobs, get jobs done more quickly and efficiently, and reduce overtime hours worked. In addition, the ability of the new digital computers to perform functions such as slant type, expand or condense type, reverse video, and interface with other computers provide the technical illustrator extra design and layout capability.

In terms of the printing and production processes, time and cost savings also occur in the photo area. This is in part because the computer produces single-sheet camera copy. By contrast, traditional camera copy consists of hand drawn art work with strips of type laid-up on and around the figure. This traditional copy forces photographers to take time to opaque out "holes" in the negatives they produce which result from the stripped-in copy.

In the printing area, time can be saved because the illustrator will rarely have to interrupt your printer to have camera copy enlarged or reduced to fit into a report, etc. The typesetter can produce copy in almost any size desired.

OTHER GRAPHIC ARTS FEATURES

Several design features are built into the newer, digital phototypesetters. For one thing, they are 6 to 7 times faster than photomechanical models and require no manual cleanup. Depending upon the model chosen, they can: slant type from 1 to 45 degrees in 1 degree increments; print in an almost infinite variety of type sizes and styles; reverse type (i.e. print white letters on a black background); expand or condense type; and interface with a variety of other computers and graphics terminals. All of these features, plus the ability to create graphics such as those presented earlier make these computers design tools for the illustrator.

Further, phototypesetters/photocompositors provide illustrators with limited page layout capability. If the need for this feature ever became great, a user could purchase a special terminal dedicated to doing page layout which would use the phototypesetter as both its input and output device.

COMPARISONS WITH COMPUTER AND ENGINEERING GRAPHICS TERMINALS

Computer and engineering graphics terminals have impressive capabilities. They are specialized computers which, in some ways, simply do different things than phototypesetting/photocompositing computers. In terms of the overall needs of technical illustrators, however, phototypesetters/photocompositors are a better match for those needs.

Advantages of computer and engineering graphics terminals include the following:

- Images can be called up on the terminal and output in slide, viewgraph, or hardcopy form in a matter of minutes
- The output is often in color
- New images can be "drawn" on the spot, interactively with the terminal.

Unfortunately, they also have several disadvantages not found in phototypesetters/photocompositors:

- Their output is suitable only for use in slides or viewgraphs because the resolution is poor and printed copies are fuzzy (unless you're prepared to spend $100,000 - 500,000 on a unit)
- Their output affects only a small portion of the art work done by most art departments
- Most documents are not printed in color, so even if the images were not fuzzy, converting them from color to black and white can be expensive, time consuming, and result in a further degraded final product
- Despite their comparatively modest cost, these computers can be very expensive (and under used) unless your customers have a great need for color visuals
- The type cannot be varied, sized, or styled for most design purposes
- They are dead-end devices. What they do, they do well; but when you must allocate scarce dollar resources to do a variety of jobs, a multipurpose phototypesetter/photocompositor is a much more cost-effective investment.

CONCLUSIONS

Phototypesetters/photocompositors are multipurpose computers which should be looked into as part of your graphics support equipment. This is especially true if you find your artists doing a wide variety of jobs. With a phototypesetter, you may be able to produce many jobs faster, cheaper, and with better quality than you can now. Production savings will trickle down to your photo and printing units as well. In addition, you will be able to do your out-of-house typesetting in-house.

National Scale Company, Inc.

Middletown, Connecticut

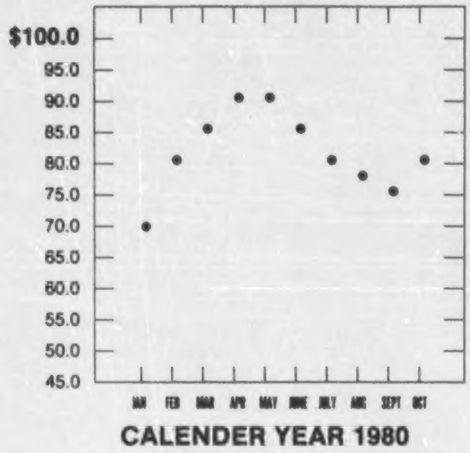


FIGURE 1

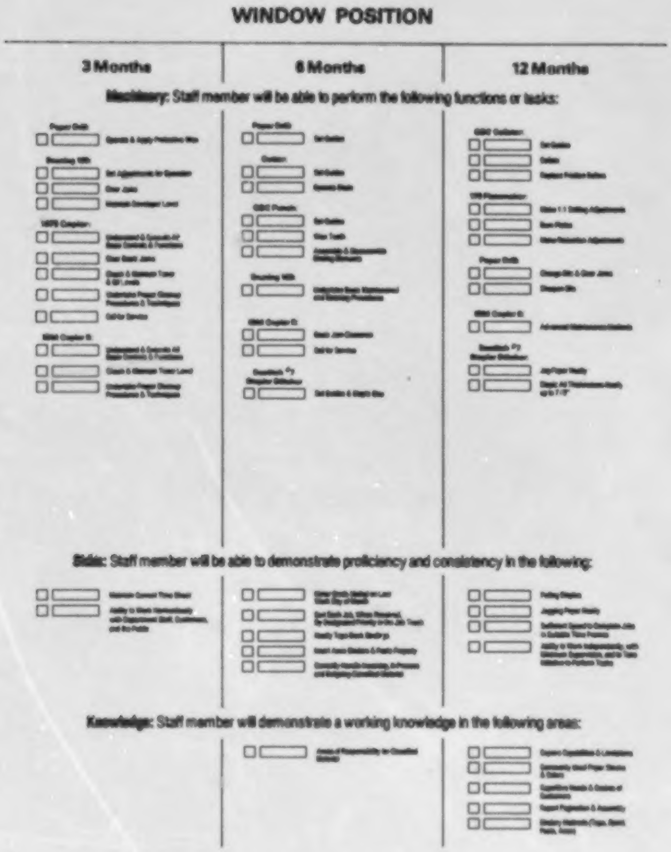
DAILY INVENTORY CONTROL

Store # _____ **Month** _____ **Wk/Ending** _____

		YIELD DAY					Mgr ok						Mgr ok						Mgr ok						Mgr ok						Mgr ok
		MONDAY						TUESDAY						WEDNESDAY						THURSDAY						FRIDAY					
	QTY	Carry Over	Pur	Trans	End Inv	Qty Sold	Var / Wast	Carry Over	Pur	Trans	End Inv	Qty Sold	Var / Wast	Carry Over	Pur	Trans	End Inv	Qty Sold	Var / Wast	Carry Over	Pur	Trans	End Inv	Qty Sold	Var / Wast	Carry Over	Pur	Trans	End Inv	Qty Sold	Var / Wast
BUN WHOPPER	[illegible]																														
BUN BURGER	[illegible]																														
BUN SPECIAL	[illegible]																														
MEAT WHOPPER	[illegible]																														
MEAT BURGER	[illegible]																														
HAM	[illegible]																														
FISH PAT.	[illegible]																														
CHEESE	[illegible]																														
TOMATO	[illegible]																														
LETTUCE	[illegible]																														
ONION	[illegible]																														
MAYONNAISE	[illegible]																														
CATSUP	[illegible]																														
PIE	[illegible]																														
BROWNIE	[illegible]																														

[illegible]

FIGURE 2



WINDOW POSITION

3 Months	6 Months	12 Months

Machinery: Staff member will be able to perform the following functions or tasks:

Skills: Staff member will be able to demonstrate proficiency and consistency in the following:

Knowledge: Staff member will demonstrate a working knowledge in the following areas:

FIGURE 3

$$R_2^2 = X \frac{Q_1 \; R_1}{P \; c^3} \div 6 y^2$$

FIGURE 4

HEADLINE

This is copy set left and indented from the left 4 picas

This is copy set right and indented from the right 4 picas

- this is copy with a bullet
- this is copy with a bullet on the second line
- this is copy with a bullet on the third line
- this is copy with a bullet on the fourth line

FIGURE 5

Bypassing Graphics Production:
A Design Approach to Producing Artwork with a Wordprocessor

David L. Buie

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This paper presents one way to work with automated equipment when designing a publication. Details how the author designed a department publication showing how to retrofit an existing motor driven measuring device on well logging trucks for Halliburton Services (Installation of BEI Encoder September, 1983). Provided is a step-by-step description of researching, writing and designing a publication and a method of integrating illustrations and screened photographs with text output from a wordprocessor to produce final artwork.

INTRODUCTION

Given the task to create a document describing how to install a modification on a major piece of equipment -- and produce copy-ready artwork as quickly as possible -- what would you do? In my case, the resources available to me in addition to a fully operational graphics and photo department were a wordprocessor and printer, a drafting machine, and copy equipment capable of making reductions. Because of the urgency of the project, I decided to design by wordprocessor, draw the illustrations, and produce all final artwork to be reproduced by copy equipment instead of scheduling production with our graphics department.

RESEARCH, WRITE AND DESIGN

Investigate All Resources

My first step was to interview the project engineer to obtain background information. It was necessary to describe how to install a modification for upgrading equipment that measures tool depth in wells. Our logging trucks at Halliburton Services use a cable measuring device to indicate tool depth by the amount of cable passing a reference point, on the surface, as the cable unwinds from a spool and enters a well bore. The device employed a selsyn motor to be replaced by an encoder whose installation procedure I would describe. During the interview, I defined my audience by asking who would be using the information I would create. Names were written down of technologists involved in the project who might contribute in some way to my work.

Next, in order for me to communicate with the engineers and technologists, materials were gathered: blueprint drawings of the kit and a complete modification kit itself. The blueprint orthographic projections provided details, part names, and dimensions for accurate and complete description of all the parts comprising the kit. The modification kit gave the means to perform each procedural step as it would be done in the field. Tools necessary for assembling the kit were also obtained.

Become Familiar with Subject

While reconstructing the steps in performing the modification, I became familiar with problem areas someone would likely encounter in the field. For example, excessive wear on bearings could result from improper installation; how to avoid this would be highlighted with an "IMPORTANT" heading in the text.

Another way that I become familiar with a subject is to draw the object(s). Having been a Technical Illustrator-Writer for approximately six years before becoming a Research Technical Writer, I acted upon experience gained while creating exploded-view illustrations. After deciding upon a view that would best show the details needing clarification, a rough sketch of each part was drawn (Figure 1).

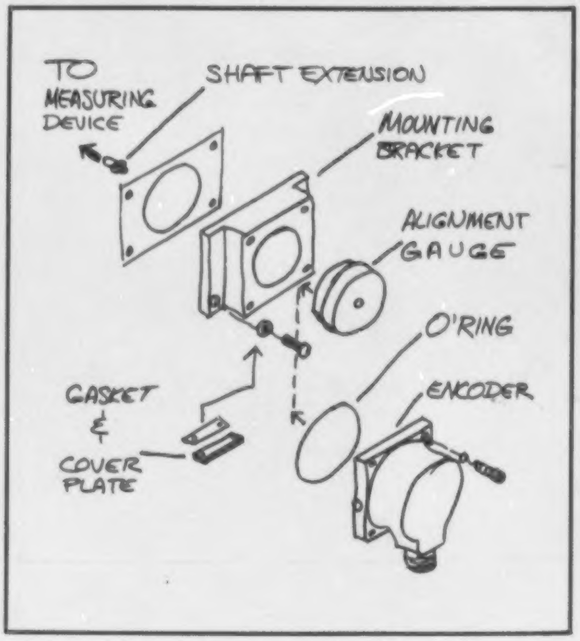

Figure 1. Kit Parts (Rough Sketch)

In addition to the parts sketches, a view was sketched showing the appearance before modification (Figure 2a) and another view showing the installation as completed (Figure 2b). These views would be presented as photographs.

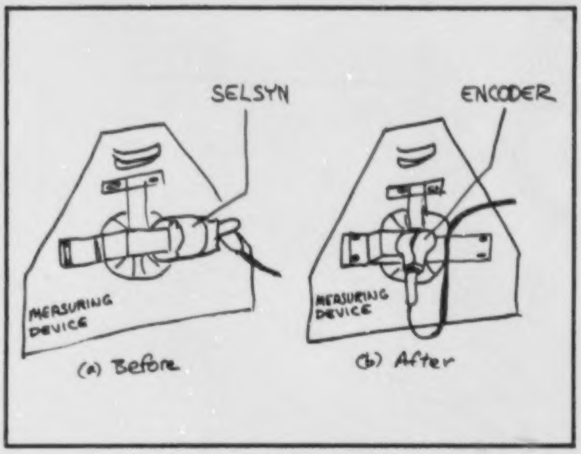
SELSYN
ENCODER
MEASURING DEVICE
MEASURING DEVICE
(a) Before
(b) After

Figure 2. Views to Photograph

Make a Mock-up

Roughing out a "skeleton" mock-up (without detailed wording), I made up a "title" and drew "boxes" to indicate probable locations for photographs and drawings. Notice that the wording in Figure 3 is limited to five major steps in the installation procedure. A mock-up is a communication tool by which one gains feedback; and feedback causes ideas to evolve. When a mock-up is presented, an idea can be either deleted (and forgotten) or developed. If developed, the design process allows each element to evolve into its final form which, incidentally, will have no resemblance to an original mock-up.

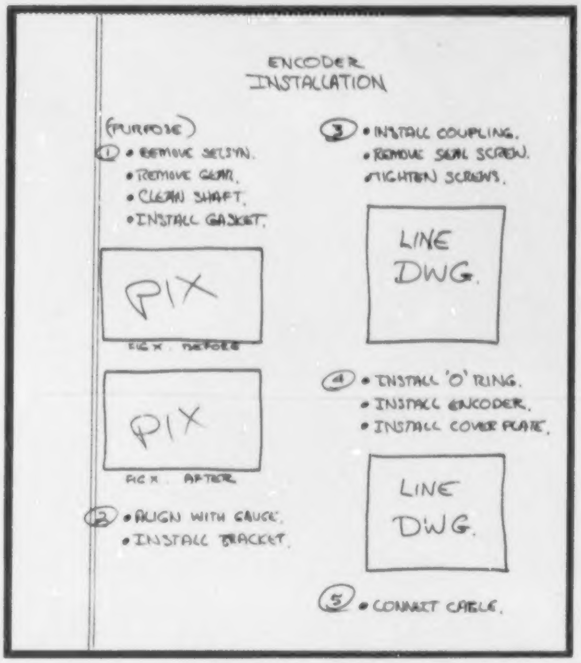
ENCODER INSTALLATION
(PURPOSE)
① • REMOVE SELSYN.
• REMOVE GEAR.
• CLEAN SHAFT.
• INSTALL GASKET.
PIX
FIG X. BEFORE
PIX
FIG X. AFTER
② • ALIGN WITH GAUGE.
• INSTALL BRACKET.
③ • INSTALL COUPLING.
• REMOVE SEAL SCREW.
• TIGHTEN SCREWS.
LINE DWG.
④ • INSTALL 'O' RING.
• INSTALL ENCODER.
• INSTALL COVER PLATE.
LINE DWG.
⑤ • CONNECT CABLE.

Figure 3. Mock-up

Tape-Record and Transcribe Discussion

Realizing detailed wording was still needed to provide "meat" for the document, information was gathered by tape-recording my next discussion with the project engineer. I showed him the mock-up and discussed in detail everything pertaining to the encoder installation. He approved my drawing and photograph views, suggestions for formatting document output from the wordprocessor printer, and choice of typestyles.

After the discussion, I transcribed the tape and entered text on the wordprocessor. Purposely ignoring organization, ideas were entered in unspecified order from the recorded tape. Formatting, as well as organization, was to be done later since my main interest was to quickly change words into type -- in rough draft form — concerning every available idea.

Schedule Photography Session

Since my ideas of photographic presentation were discussed with and approved by the project engineer, I was confident of what was needed in the photos (such as angles to be shot) when directing the session. Also, other views were included in case a need should arise when equipment would not be available as the logging equipment soon would be sent to a foreign country. Upon receipt of the contact proofs, those having proper arrangement and lighting would be returned for 8" x 8" enlargement.

During photograph preparation, I constructed the technical illustrations, using as a guide the rough sketches made earlier.

Create a Rough Draft

Keeping assembly sequence uppermost in mind, the transcribed information on the wordprocessor was reorganized and printed. The isometric illustrations (construction lines still visible as in Figure 4) were included to form a rough draft copy.

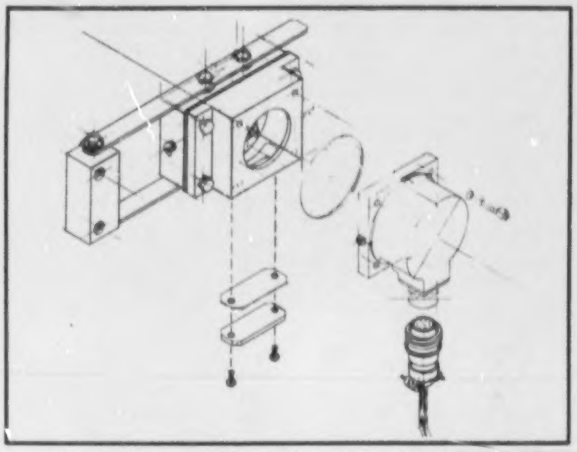

Figure 4. Example of Isometric Construction

Construction illustrations were used in preparing the rough draft to save time during the design process and to allow adaptation to engineering changes. Personnel involved in the project noted their comments on a rough draft copy submitted to them. Feedback from them pointed out areas of ambiguity. After discussing all improvements with the project engineer, the document was edited on the wordprocessor.

The exploded- and cutaway-view illustrations were revised and inked as shown by example in Figure 5.

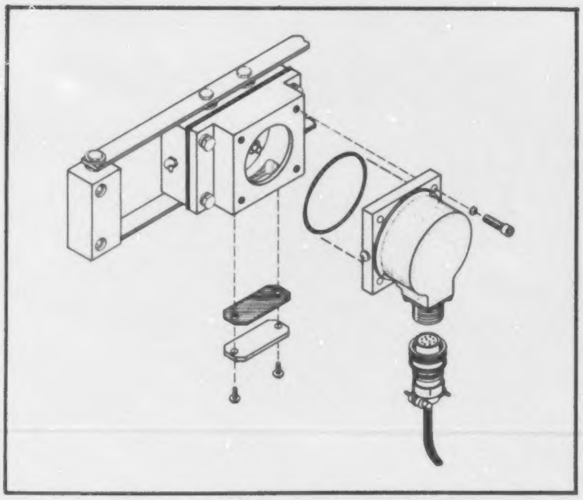

Figure 5. Example of Inked Technical Illustration

Design Wordprocessor Output

For this project, a *sans serif* type was selected to prevent a typewritten appearance. Two-column format creation is too involved to explain in detail here. Suffice it to say that I typed the paragraphs in the left-hand column and later moved selected text to the right-hand column. I used the lowercase 'o' (later filled-in with ink) to represent bullets to begin each sentence instruction. A sample of the format as it appears in the publication is shown in Figure 6.

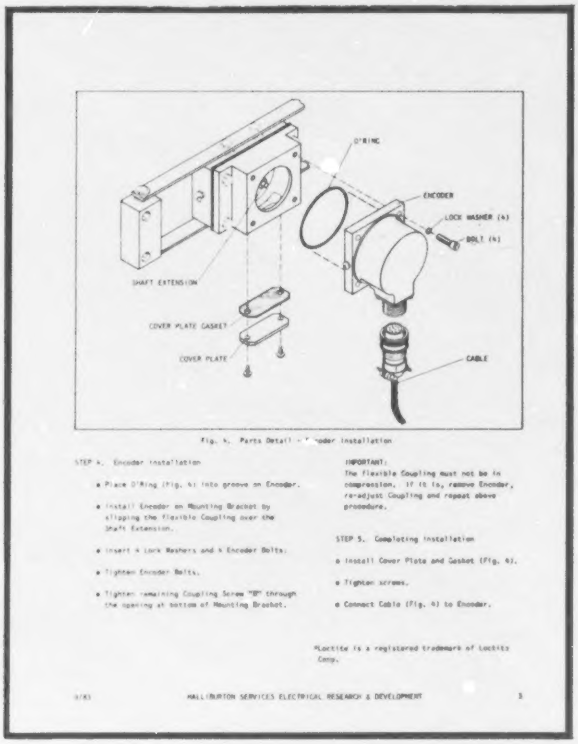

Fig. 4. Parts Detail - Encoder Installation

STEP 4. Encoder Installation

- Place O'Ring (Fig. 4) into groove on Encoder.
- Install Encoder on Mounting Bracket by slipping the Flexible Coupling over the Shaft Extension.
- Insert 4 Lock Washers and 4 Encoder Bolts.
- Tighten Encoder Bolts.
- Tighten remaining Coupling Screw "B" through the opening at bottom of Mounting Bracket.

IMPORTANT:
The Flexible Coupling must not be in compression. If it is, remove Encoder, re-adjust Coupling and repeat above procedure.

STEP 5. Completing Installation

- Install Cover Plate and Gasket (Fig. 4).
- Tighten screws.
- Connect Cable (Fig. 4) to Encoder.

*Loctite is a registered trademark of Loctite Corp.

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Figure 6. Two-column Format and Footer Example

Choosing the "Create or Revise Footer" command in the Format Selection Menu, I created a footer (typed information appearing at the bottom of Figure 6) to include an issue date, our department name, and document page number. This information appears on each page of the document; page numbering is automatic.

I edited the document until satisfied that it would become the "Stand-Alone" text.

Bring It All Together

Typed copy of the "Stand-Alone" text from the wordprocessor printer determined the exact spacing required for text. The 8" x 8" photos and inked drawings were reduced by copy equipment to conserve cost. Having in my possession copies of type, photos, and drawings that were properly sized, I was ready for the next step.

Tape-up An Artwork Draft

Keeping in mind that a figure was to follow the first reference to it in the text, each segment of text was taped down to allow space for figure illustrations (Figure 7).

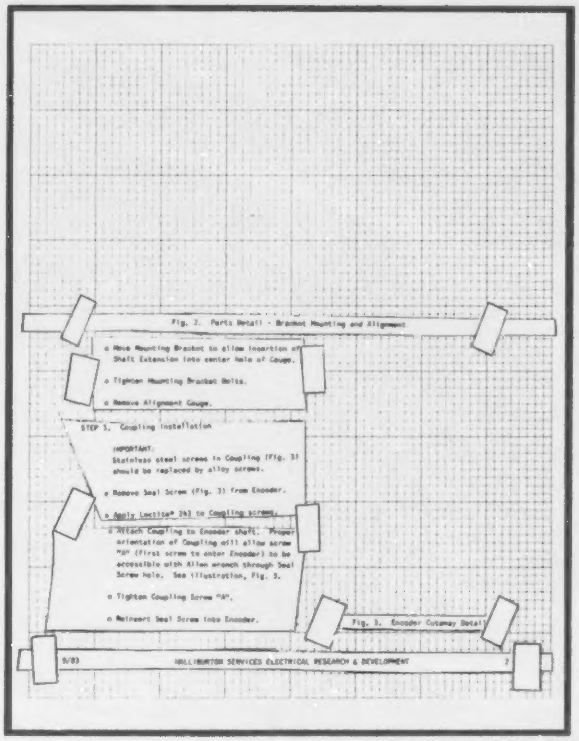

Fig. 2. Parts Detail - Bracket Mounting and Alignment

o Move Mounting Bracket to allow insertion of Shaft Extension into center hole of Gauge.

o Tighten Mounting Bracket Bolts.

o Remove Alignment Gauge.

STEP 3. Coupling Installation

IMPORTANT:
Stainless steel screws in Coupling (Fig. 3) should be replaced by alloy screws.

o Remove Seal Screw (Fig. 3) from Encoder.

o Apply Loctite* 262 to Coupling screws.

o Attach Coupling to Encoder shaft. Proper orientation of Coupling will allow screw "A" (first screw to enter Encoder) to be accessible with Allen wrench through Seal Screw hole. See illustration, Fig. 3.

o Tighten Coupling Screw "A".

o Reinsert Seal Screw into Encoder.

Fig. 3. Encoder Cutaway Detail

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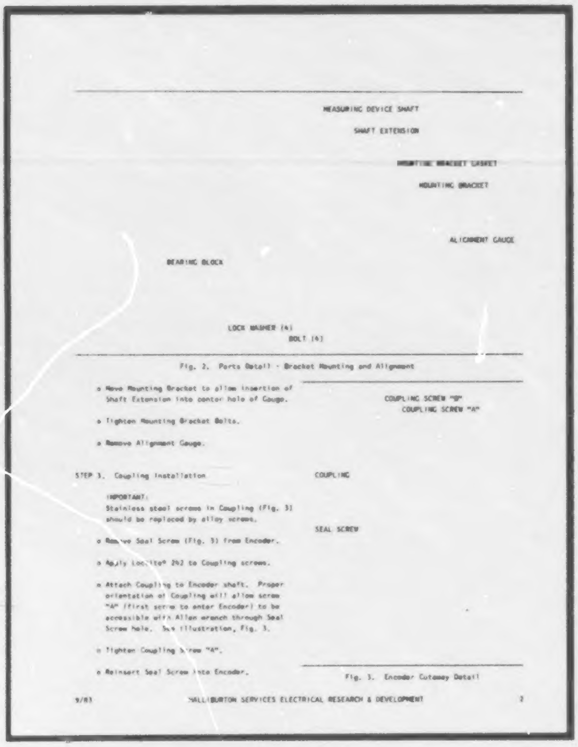
Figure 7. Sample of Taped-up Artwork Draft

Spacing for each illustration was easily determined (since I had copies) but I needed to determine exact PLACEMENT of each illustration in order to "wrap-around" text as it would appear in the document on the wordprocessor. Separating text at convenient places was one portion of the design cycle that required experimentation to achieve the desired effect.

PRODUCE FINAL ARTWORK

Edit for Space

Using the taped-up artwork draft as a pattern, I edited the document on the wordprocessor. Our wordprocessor has one drawback in that it will not type vertical lines; I would have to rule (ink) these later on the printed output serving as my base artwork. Typing horizontal lines and adding spaces in between to reserve space for placement of illustrations simplified the job. In the space between the lines, part names were typed and placed in proximity to their respective parts (with illustration properly positioned). See Figure 8.



MEASURING DEVICE SHAFT
SHAFT EXTENSION
MOUNTING BRACKET GASKET
MOUNTING BRACKET
ALIGNMENT GAUGE
BEARING BLOCK
LOCK WASHER (4)
BOLT (4)

Fig. 2. Parts Detail - Bracket Mounting and Alignment

o Move Mounting Bracket to allow insertion of Shaft Extension into center hole of Gauge.

o Tighten Mounting Bracket Bolts.

o Remove Alignment Gauge.

COUPLING SCREW "B"
COUPLING SCREW "A"

STEP 3. Coupling Installation

COUPLING

IMPORTANT:
Stainless steel screws in Coupling (Fig. 3) should be replaced by alloy screws.

SEAL SCREW

o Remove Seal Screw (Fig. 3) from Encoder.

o Apply Loctite® 242 to Coupling screws.

o Attach Coupling to Encoder shaft. Proper orientation of Coupling will allow screw "A" (first screw to enter Encoder) to be accessible with Allen wrench through Seal Screw hole. See illustration, Fig. 3.

o Tighten Coupling Screw "A".

o Reinsert Seal Screw into Encoder.

Fig. 3. Encoder Cutaway Detail

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Figure 8. Typed Output from Wordprocessor

Preparing the Final Draft

Vertical lines (see "A" in Figure 9) were inked on the typed output to form complete boxes. Each technical illustration was pasted down within the boxes after carefully trimming (see "B", Figure 9) to expose part names. Several lines were ruled on transparent tape and cut into narrow strips. Each strip became a callout line (see "C", Figure 9) between a part name and its illustrated part. This technique provided a smooth line appearance over the layers of artwork. Lowercase o's were filled in to form bullets (see "D", Figure 9).

To obtain an unbiased perspective, the final draft was presented to someone NOT familiar with the subject. After considering his comments and making valid changes, I requested preparation of the final screened photographs and reduction prints from the photolab.

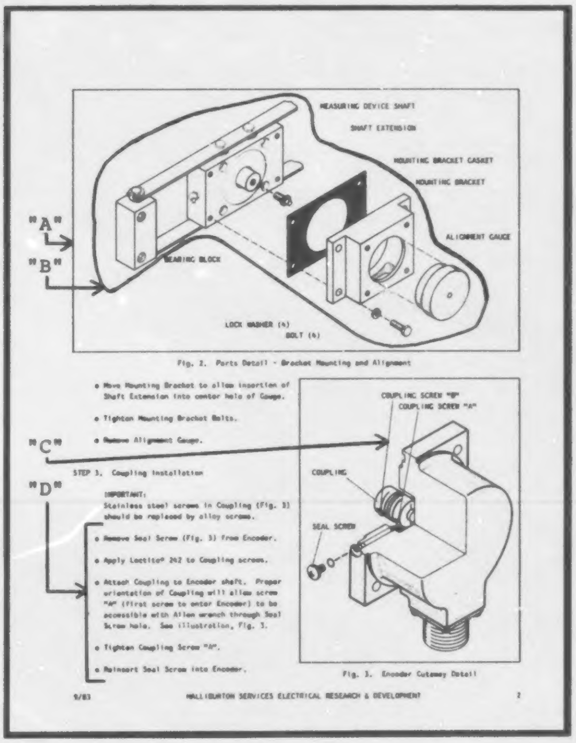
"A"
"B"
MEASURING DEVICE SHAFT
SHAFT EXTENSION
MOUNTING BRACKET GASKET
MOUNTING BRACKET
ALIGNMENT GAUGE
BEARING BLOCK
LOCK WASHER (4)
BOLT (4)
"C"
"D"
COUPLING SCREW "B"
COUPLING SCREW "A"
COUPLING
SEAL SCREW

Fig. 2. Parts Detail - Bracket Mounting and Alignment

● Move Mounting Bracket to allow insertion of Shaft Extension into center hole of Gauge.

● Tighten Mounting Bracket Bolts.

● Remove Alignment Gauge.

STEP 3. Coupling Installation

IMPORTANT:
Stainless steel screws in Coupling (Fig. 3) should be replaced by alloy screws.

● Remove Seal Screw (Fig. 3) from Encoder.

● Apply Loctite® 242 to Coupling screws.

● Attach Coupling to Encoder shaft. Proper orientation of Coupling will allow screw "A" (first screw to enter Encoder) to be accessible with Allen wrench through Seal Screw hole. See illustration, Fig. 3.

● Tighten Coupling Screw "A".

● Reinsert Seal Screw into Encoder.

Fig. 3. Encoder Cutaway Detail

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Figure 9. Final Draft Preparation

Artwork Paste-up

Final artwork is the typed output from the printer and photographs and prints to be pasted down. I selected 70# bond (8½" x 11") as an artwork base because it will readily feed through the printer, yet have a firmness for paste-up of artwork. Paper was easier to maneuver (as opposed to illustration board) when duplicating with copy equipment and it takes less space when filing. Photographs were processed with a 100-line screen to establish a dot pattern for making quality reproductions from the copier. Photos and reduction prints of the line drawings were trimmed and pasted down. Actually, the process for artwork paste-up was similar to that described in "Preparing the Final Draft", but more care was involved in inking of the vertical lines, illustration alignment, placement of callout lines, and inking of the o's representing bullets.

The completed work was proofed and, after final review by the project engineer, the artwork was duplicated for distribution.

Instead of employing typesetting services when a need arises for creating a publication, technical writers having wordprocessing equipment may opt to create copy-ready artwork using this design approach.

How to be Your Systems Analyst's Analyst

Cynthia Felice and David Saad

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Colorado, 1979 - Johnson &
Wales College, Providence,
RI

ABSTRACT

This panel will look at a case history of automating the document control functions for an IC manufacturer from the perspectives of the systems analyst and system user. The project required cooperation between professionals in two disciplines, and proved to be an educational experience for both. The discussion will stress an area not covered in the papers — how to apply the lessons from the project in developing a revised and more powerful document tracking system.

INTRODUCTION

Cynthia Felice presents the user's side of the software development story in her paper, "The Future is Now for Automating Document Control — A Case History for the User." She recounts how, working with the systems analyst, her initial specifications were transformed into an operating document tracking system.

David Saad discusses development of the document tracking software from the system's analyst's perspective in his paper, "The Future is Now for Automating Document Control — A Case History by the Systems Analyst." He notes the importance of designing a system that can be easily changed to accomodate future enhancements, considerations in choosing a programming language, and the importance of understanding document process flow in system development.

The panelists jointly will review possible future improvements in the document tracking system.

The Future is Now for Automating Document Control
A Case History for the User

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ABSTRACT

Documentation is the foundation of quality assurance and traceability for an IC manufacturer. As a company grows, documentation becomes a prime candidate for automated record keeping. From the user's perspective, this automation must include provisions for internal records, external records, and management reports. DATATRIEVE, a data management program, permitted the systems analyst to design an interactive database maintained by Document Control Group personnel. This database is derived from user-written specifications for each report. The initial specifications, and discussions between user and systems analyst, enabled the analyst to design a system to meet the Document Control Group's needs.

The Document Control Environment

In an IC house, documentation is the foundation for the quality assurance and traceability system. Processes and pieceparts are constantly monitored for variations from the governing procedural document or attribute specification. Such monitoring permits early detection of errors and problems, thus saving unnecessary expense. But there's a continuous evolution in processes and pieceparts, which the documentation must reflect accurately and in time to implement the change in the manufacturing process.

UTMC depends on the Document Control System for information on which documents are being processed, which revision levels of the documents are applicable now and—in the case of Failure Analysis or Reliability Engineering groups—which revision levels of the documents were applicable on a specific date.

For a look at this project from the systems analyst's perspective, see David Saad's paper, "The Future Is Now for Automating Document Control, A Case History by the Systems Analyst."

When Document Control geared up in late 1981, it wasn't difficult to maintain a manual system of internal records listing status of current work and released documents. UTMC was a new company and only about twenty-five people were actively concerned with how documents were controlled. Traceability was a snap. We could literally count quantities of items or processes needing tracing on our fingers.

We manually compiled our internal records, a log book listing document numbers and titles, status of the document, and applicable revision levels. From our log book we compiled update memos to concerned departments letting them know which documents we were processing, which revision level they should be using in manufacturing and engineering, and the disposition of completed document transactions—approved and released, or disapproved.

Management reports were a bit primitive, just a list of how many documents were approved and released and a number to indicate total holdings. But it wasn't long before Document Control processed as many as 400 different transactions on 200 different documents a month. As we approched that level of activity, we knew we were prime candidates for automated record keeping.

We already had terminals on everyone's desk that were linked to two VAX 11/780 computers, one of which primarily supported CAD engineering functions and the other CAM and administrative functions. VAX supported Document Control's word processing and an electronic mail utility. Additionally, we had developed a command procedure that anyone with a terminal could access from either computer to get a listing of current applicable documents. What we needed now was simple: a way to put our log book on the computer and extract the data to compile internal and external records and management reports.

We contacted UTMC's Management Information Systems group, showed them our manual log and reports, and asked if they could help. They said they could, and assigned David Saad, Senior Systems Analyst, to the project. David estimated that development of the system would take about six working weeks.

Six Weeks!

The development time was only the first of many surprises. How could it possibly take six weeks to convert a manual system to a computerized one? All I needed was the following:

Internal Records

- List of current work
- Status of current work
- Applicable revision levels
- Projected workload

External Records

- What's being processed
- Applicable revision level
- Disposition of recent transactions

Management Reports

- Productivity
- Resource and Value

Even with our new high levels of activity I could go through all the folders in the Document Control area, determine the status of every document, and make my report in a day. I wondered if automation were worth it. Then David pointed out that if I needed the same reports tomorrow to include changes that were happening even as I made the reports, I would have to spend another whole day going through the stack of folders. Up-to-the-minute reports, not day-old and not even hours old, intrigued me. I asked him how I could help.

Problem Definition - Writing the Straw Man

David explained that he would be using DATATRIEVE, a versatile and powerful software data management tool. DATATRIEVE would permit him to store data and define logical relationships among data structures. Document Control would maintain the database in an interactive mode. David had seen our reports and now he wanted me to describe what additional information I wanted on them and what the fields would look like. I was pretty sure he didn't mean amber wheat fields, but I'd never thought of documentation information in terms of fields. A few were obvious to us both: document number, title, and revision level. But that wasn't enough. David needed a written specification describing each report. He would work out the details for the best method of capturing the data, including screen layout of the data fields.

I wrote a specification that described the desired results for internal, external, and management reports. Each report contained five to ten statistics or types of information and a description of how we collected that information manually. For instance, one item on an internal report was elapsed time for document processing. We counted the number of days between the login and the send-out dates for all documents processed in the month. Then we divided the cumulative days elapsed by the number of documents processed to determine average elapsed time. For predicting workload, we counted the number of documents each department had scheduled to publish in each month. My written specifications for each desired piece of information on the reports were about as brief as the preceding two sentences. I didn't know it at the time, but I had written a good straw man specification.

Understanding the Problem - Reworking the Straw Man

The written specification of the reports, the desired end result, helped us define the data fields. For instance, we now knew that in addition to the document number, title, and revision level, we needed a projected publication date and the number of the department involved. We also realized we would need a record of the document in the system BEFORE Document Control actually received the document. Since we wouldn't actually be working on scheduled documents in this instance, we would need two types of records, one for scheduled documents, and one for current work. We called them RESERVES and TRANSACTIONS. A TRANSACTION could be further categorized into OPEN, DISAPPROVED, or APPROVED. We were making progress, but we encountered problems, too.

DATATRIEVE was a sophisticated sorting system, but my understanding of it was initially very simple. It sorted on specified fields, ignoring any records that did not meet the selection criteria. The resulting group of records could be sorted on yet another field to group similar data or narrow the record selection even further. It didn't seem to me that it could handle all my requirements by sorting records.

I had pieces of information that applied only to one revision level of a document but not to earlier or later revisions. For instance, the person who wrote the original document might not be the person who revised it. Or the approval signatories could have changed between revisions A and B, and I needed to know who approved which revision without losing track of either set of signatories.

Mechanical definitions weren't clean-cut. Revision A of a document that we're processing in Document Control didn't become revision A to the manufacturing arm of the house until it was approved and released. There might be a temporary revision A in use for the interim period, and it was quite possible that the actual revision A might be disapproved and never released in that form, or that we might do some "hot document processing" of yet another revision to that document, which would then become revision A, transforming the revision initially designated as A during processing into revision B at release time. And of course revision A and B had absolutely nothing to do with editorial grades A and B for document content.

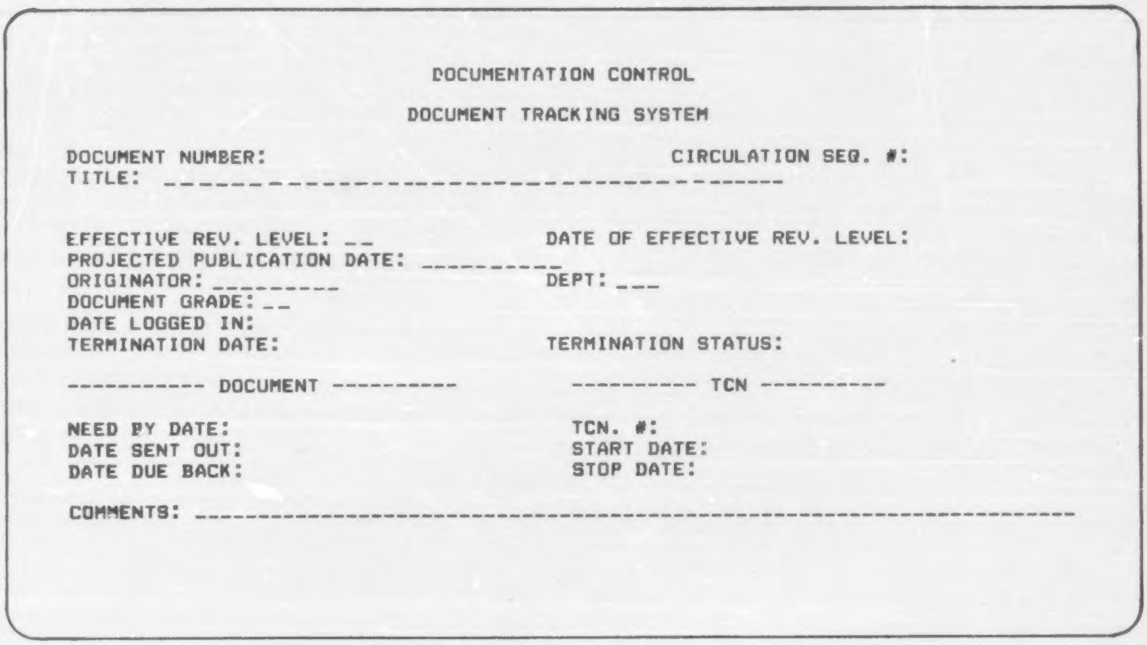
Redefining the Problem

Once we had a written specification, we had a basis for discussing problems. David needed to understand my concerns about rigidly defining a field called Document Revision Level and expecting a data entry of "revision B" to remain revision B throughout document processing. With the straw man specification in his hands, we stepped David through our internal procedures for processing documents, and when necessary, we stepped through them again. Along the way we identified data fields that were not evident in the straw man but which had logical associations with other fields by providing more detail about them. In the end, we defined fourteen fields, which David arranged in two display and data entry screens, the first of which is shown in figure 1.

Had David redefined the problem on the basis of the straw man alone, the reports might not have produced the desired result, or the data entry procedure would have been cumbersome for Document Control to use during document processing. For instance, recording the date of signatory response is near the end of document processing, so it was placed on the second screen, which could be passed over during other data entry procedures. And while we needed to know the revision date of each document transaction displayed in the first screen, the effective date wasn't known until the document processing was complete. To prevent switching screens during data entry, David designed a termination transaction that updated fields like effective revision date on the first screen without our having to see it.

Figure 1

TRACK DATA FIELDS SCREEN DISPLAY



```
                         DOCUMENTATION CONTROL

                       DOCUMENT TRACKING SYSTEM

DOCUMENT NUMBER:                                     CIRCULATION SEQ. #:
TITLE: ---------------------------------------

EFFECTIVE REV. LEVEL: --             DATE OF EFFECTIVE REV. LEVEL:
PROJECTED PUBLICATION DATE: ----------
ORIGINATOR: ---------                DEPT: ---
DOCUMENT GRADE: --
DATE LOGGED IN:
TERMINATION DATE:                    TERMINATION STATUS:

----------- DOCUMENT ----------        ---------- TCN ----------

NEED BY DATE:                          TCN. #:
DATE SENT OUT:                         START DATE:
DATE DUE BACK:                         STOP DATE:

COMMENTS: --------------------------------------------------------
```

Exceptions

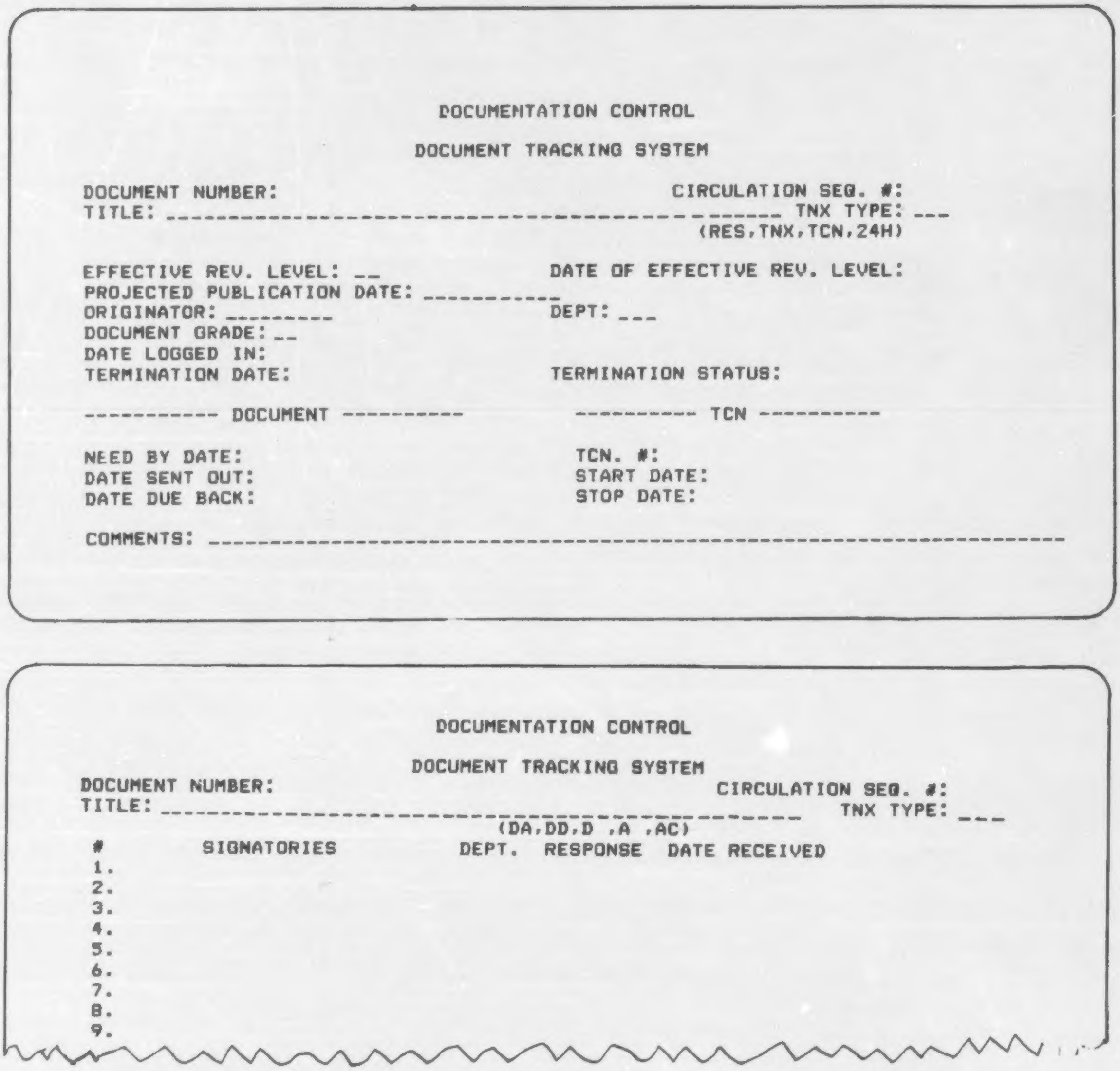
But we weren't home free yet. That effective revision level field was causing a problem. There could be four revision B documents in our system at the same time, each of them a legitimate transaction.

1. Revision B (a temporary change (TCN), which will expire on a specified date)
2. Revision B (an upgrade of Revision A during processing)
3. Revision B (an upgrade of Revision A that is approved BEFORE the Revision B described in 2, even though it has a later log in date.)
4. Revision B (an upgrade of Revision A that was disapproved and will never be released in its current form.)

Since temporary changes must expire, we designated another record type to record their use, a TCN record. That record type designator permitted us to distinguish condition 1 from open transaction conditions 2 and 3. A cross-reference listing of each document record listed for a document number gave visibility to our having two open B transactions. The first open B to be approved and released would receive a status indicator of APPROVED, and if the second open B transaction were approved later, its effective revision level would be changed to C. If it were disapproved or withdrawn, the revision level would remain B, but the status indicator would be DISAPPROVED or WITHDRAWN, thus permitting distinction from any other B records for that document number. As a result of dealing with all the exceptions, our final display screens were as shown in figure 2.

Figure 2

Final Screen



```
                         DOCUMENTATION CONTROL

                       DOCUMENT TRACKING SYSTEM

DOCUMENT NUMBER:                                   CIRCULATION SEQ. #:
TITLE: _____________________________________________________ TNX TYPE: ___
                                                     (RES,TNX,TCN,24H)

EFFECTIVE REV. LEVEL: __               DATE OF EFFECTIVE REV. LEVEL:
PROJECTED PUBLICATION DATE: ___________
ORIGINATOR: _________                  DEPT: ___
DOCUMENT GRADE: __
DATE LOGGED IN:
TERMINATION DATE:                      TERMINATION STATUS:

----------- DOCUMENT ----------          ---------- TCN ----------

NEED BY DATE:                            TCN. #:
DATE SENT OUT:                           START DATE:
DATE DUE BACK:                           STOP DATE:

COMMENTS: ____________________________________________________________
```

```
                         DOCUMENTATION CONTROL

                       DOCUMENT TRACKING SYSTEM
DOCUMENT NUMBER:                                       CIRCULATION SEQ. #:
TITLE: ___________________________________________________    TNX TYPE: ___
                                 (DA,DD,D ,A ,AC)
#        SIGNATORIES          DEPT.  RESPONSE  DATE RECEIVED
1.
2.
3.
4.
5.
6.
7.
8.
9.
```

Track Implementation

After training the Document Control personnel to use the system and inputting data from paper records, the Document TRACKing System was ready for validation and verification. It provided an Open Transaction Report, a Document Index, an internal Document Control Department Activity Report, and an external Documentation Scheduling Detail Report. As an added bonus, it looped through signatory responses and gave us a report of people who were late in turning in their written approvals of documents.

There was only one remaining problem. The first phase core of the system, the tracking function, had met both my expectations and my immediate needs. I could see a tremendous potential for using it as Document Control's primary tool for "controlling" documents, not just tracking. The information for determining trends of activity by owning and using groups, document type, or document lifetime, and for spotting bottlenecks in processing documents was right there in the system. I knew TRACK's current capabilities, knew where the hooks were for modification, and could specify where to make trade-offs for convenience and speed. I could make decisions about adding fields and new sorting sequences, yet be fully aware of the impact the additions would have on old routines, for I had seen the future and knew I could make it work—AGAIN.

The Future is Now for Automating Document Control
A Case History for the Systems Analyst

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ABSTRACT

Analysis of requirements for automating Document Control showed the need for an on-line, user-driven system. The first task was to pool the analyst's systems knowledge and the user's applications knowledge. Developing a simple document tracking system was the goal; however, it was important to design this phase to accomodate future enhancements. As a high-level design emerged, DATATRIEVE was chosen as the programming language instead of COBOL. The next step was for the analyst to learn the process flow of Document Control. From this, it was possible to develop a detailed design, with later allowances for processing exceptions.

The Management Information Systems Environment

At UTMC, the Management Information Systems (MIS) support function comprises two functional groups. One group supports a comprehensive computer-aided-manufacturing (CAM) system. The second group, Business Systems, is responsible for providing programming support for accounting and administrative systems.

Our computer environment consists of two Digital Equipment Corporation (DEC) VAX 11/780's running under VAX/VMS operating system V3. COBOL is our standard programming language, and we also use several programming tools in our software development efforts. These tools are DEC's data base management system (DBMS), DEC's form management system (FMS), and DEC's query and report generation system (VAX-11 DATATRIEVE). The Business Systems group uses both FMS and DATATRIEVE extensively for business systems development.

FMS aids designing and integrating on-line screen entry and display into applications. DATATRIEVE is a user-oriented tool that is very sophisticated in its ability to access and modify data stored in files for adhoc queries and reporting. It's comprehensive enough to use in developing complete systems, including data entry (it interfaces with FMS to provide formatted on-line screen entry and display), data maintenance, data query, and formatted data reporting. DATATRIEVE's simple English-like commands allow nonprogrammers to develop systems, but UTMC programmers have found it an excellent tool for solving system problems and use it extensively instead of COBOL in the development of administrative and accounting systems.

Using COBOL, FMS, and DATATRIEVE, the Business Systems group has created and maintained a comprehensive set of on-line systems. Since UTMC does not have any computer operators, all systems must be user-driven, available for execution on user demand, and function harmoniously with the user's daily activities and duties.

When the Document Control Supervisor, Cynthia Felice, asked Business Systems to analyze her requirements for automating Document Control processing, I was assigned the task. I quickly concluded that Document Control's automated system, like our other business systems, would best serve the department if it were on-line and user-driven. A user-driven system provides flexibility of operation, yet meets the requirements of timely document tracking and reporting.

For a look at this project from the user's perspective, see Cynthia Felice's paper, "The Future Is Now for Automating Document Control, A Case History by the User."

Inital Analysis

During the initial analysis and logical design, I encountered, as most analysts do, a knowledge gap. I knew systems and how to design and develop them but I knew next to nothing about Document Control or how the department functioned. On the other side, Cynthia Felice knew what she wanted an automated system to provide, but had very little idea as to the effort and information required to automate the manual system. This gap had to be bridged for Cynthia and myself to work together to arrive jointly at a solution that would meet her requirements. I would have to become familiar with the procedures and controls used in Document Control processing and Cynthia would, as a by-product of our discussions, better understand some of the complexities of her environment. It would be a learning experience for both of us.

Six Weeks - The Project Estimation and Schedule

Usually the user is surprised when informed of how much time is required to develop an automated system. Document Control was no exception. My six-week estimate was an elapsed time estimate; 50% of the time would be dedicated to developing the automated Document Control system, the other 50% would be spent on prior committments. My estimate was based on Document Control's current requirements, which Cynthia and I had defined during several meetings, and my analysis of the existing manual system.

During our discussions, although Cynthia had a modest list of what she wanted from TRACK (that's what we called the automated system), I knew that after she got a "taste" of what information could be retrieved from the database, coupled with knowing the volume of document processing was growing rapidly, she would soon require TRACK to tell her more. Cynthia and upper management would want more information to "fine tune" the tracking of documents. They would want TRACK to assist in forecasting workloads, revealing trends, discovering bottleneck areas, and generating data to use in graphical presentations. I saw TRACK as a simple tracking system, but also realized the potential for it to become a sophisticated control system, not limited to tracking. We both agreed there would be a need for a Phase II. For now, however, Cynthia's immediate concern was a basic tracking system to alleviate the paperwork bottleneck that had developed due to the increased document processing workload. While we concentrated on the "core" requirements, I did not lose sight of the future potential of TRACK and knew that a major goal of this development had to be flexibility so that future enhancements from Phase II would fit into the skeleton we were currently designing.

Any changes in our design after the start of programming would adversely affect our six weeks' schedule. Thus we carefully studied proposed additions and changes to insure the requests were corrections or fine tuning to our design as opposed to a "wish list" request that could be postponed to Phase II. In all cases, the user, Cynthia, needed to make the decisions and feel comfortable with the trade-offs so that we did not compromise the level of satisfaction with the delivered automated system.

Problem Definition - The Logical Design

By now, we had developed a high-level logical design detailing the functions required:

Document Maintenance

- Add document records
- Error correction
- Document record updating to track document through processing

Internal Reporting

- Open transaction log
- Document index
- Document processing backlog
- Document record cross-reference

Management Reporting

- Monthly status detail
- Monthly status summary

I decided to use DATATRIEVE to program the TRACK system. Some of the reasons for choosing DATATRIEVE over COBOL were:

1. Usage level of the TRACK system would be low. At any time, only 1-2 people would be accessing the TRACK database.

2. Low-volume data activity.

3. DATATRIEVE is a user-oriented tool and would allow the user to modify the track system as desired.

4. Time involved to complete the system using DATATRIEVE is much less than using COBOL. The benefit of using COBOL over DATATRIEVE for this system did not justify the greater expenditure of time required had COBOL been chosen.

5. Ease of modification of programs written in DATATRIEVE. This would assure better response time to changes in the document tracking environment when the changes dictate a modification to the automated system.

The next step was to generate a more detailed definition of the data flow through the TRACK system. I listed the information Cynthia required as output from TRACK, keeping in mind possible future requirements. Once the outputs were defined, I determined what information would need to be captured to provide Cynthia with the level of reporting she desired. In simple terms, what was needed out of TRACK determined what to put into it. In our case, it was not cost effective to capture information strictly for a future requirement. In the future, DATATRIEVE would provide the mechanism for data collection modification to allow additional information to be captured.

At this time, I needed specific data characteristics, such as the number of characters in a field and its format, and the algorithms applied to the data to compute statistics that were accurate and meaningful. Cynthia and I attempted to dissect the problem at a more detailed level. As we better understood the problem we also realized that we had more questions and fewer answers. This experience is known as "the more you know about something, the more you realize you know less about it". We had to overcome this learning curve to identify and document the specifications for the TRACK system.

Understanding the Problem - The Physical Design

At this stage of analysis I needed to understand the processing logic the manual system operators performed. Some of this logic is almost second-nature, and although the operator is performing several logical steps, unless specifically asked, the operator will fail to mention them as part of the task. For instance, how does the operator know the document is a TRANSACTION versus a temporary change notice (TCN) versus a RESERVED document? How does the operator know a document is DISAPPROVED versus APPROVED or APPROVED CONDITIONALLY? It's imperative that the analyst get the user to think in the step-by-step process used to make decisions without taking any step for granted. Much of the logic of the manual system is within the minds of the operators. Automating the system attempts to remove some of the decisionmaking from the operator and incorporate it into the logic of the automated system. Now I needed to know the answers to questions like these:

- How were document numbers assigned?
- Did the document number have any meaning?
- How were document revision levels assigned?
- How does one distinguish a revision from an original document?
- Do signatories need to be verified against a pre-defined approval matrix?
- Can we determine who needs to sign off on the document simply by examining some fact about the document or does it vary?

In a manual system there is usually some flexibility that an automated system constrains. We have to solidify certain aspects of an automated system. For example, if in the manual system we needed to increase the size of the document number, the operator would simply assign the larger number and write it on the control form(s). A field-size change that's trivial in a manual system can potentially be a major change in an automated system. Screen layouts and reports that list the information may need redesign, requiring programming efforts.

The other side of the coin also exists. Some changes that would be major in a manual system can be trivial in an automated system, such as rearranging a report. The point is that although the automated system may mirror the manual system in functionality, the methods employed and effort required to perform any particular aspect of the manual and automated systems are different. These differences are not limited to how changes impact the system.

In a manual system the user can assess reasonableness while entering data. For instance, document revision D is submitted. The operator, having processed revision A two weeks ago, suspects that revision D is incorrect. After reviewing the files, the operator determines that revision D should be revision E and makes the correction on the control form. How do we implement this type of reasonableness check in an automated system?

A good automated system attempts to verify all data input for validity and reasonableness. We need to develop logic to duplicate the mental process the operator performed. One interpretation of the logic may be:

> When the revision level is entered, search all existing document records on file for the same document number and verify that the revision level entered is the next sequential increment over the highest revision level already on file.

Basically that's exactly what the operator does in the manual system, but the operator takes this logical process for granted.

Sometimes validity checking best remains under the control of the user. For instance, Document Control receives a document and assigns it content grade B, indicating that it needs editing, which can only be determined after a review of the document's content. Since the document itself is not part of the automated system, the system cannot assign the document grade. In this situation the grade assignment must remain under the control of the operator.

Once we define the data required along with any data validation and reasonableness checks required, the next step is to design data entry screens and reports. To reduce operator errors and increase productivity, the data entry screens are designed to display and prompt for data in a logical sequence. This reduces the time necessary to skip over irrelevant fields. The reports also are designed with the data listed in the most useful format and style with appropriate headings and summarization. It is of prime importance to know the intended audience of the reports so they show the right mix of detail versus summarization. And finally when you think you have things defined, it's time to redefine it in more detail.

Redefining the Problem - Detail Design

At this point we had a good feel for the data required. Now came the two critical questions:

- Where would the data come from?
- How would the data be captured?

I spent a lot of time stepping through the flow of document processing. I not only needed to know what steps the operator went through and in what sequence, but I also needed to know the logical relationship of the steps. Knowing step 2 came after step 1 in the process flow was not sufficient. I needed to know:

- Does step 2 always come after step 1?
- How much time was involved in each step?
- Was there a time delay between the two steps? Did the operator perform some unrelated work between the two steps because there was a forced delay (such as awaiting someone's written approval)?

I learned that the processing flow through the Document Control Department was not always continuous. During various stages, the document was circulated to other departments and processing halted for a specified time, then resumed when the document was returned. The automated system had to have logical breaks in it to coincide with delays in processing.

By the time my review of the process flow was complete, I had a much better understanding of how documents were processed. As a result, we made several additions to our design. First, it was clear that the operator, when entering data, sometimes had to review other document records before deciding what revision level to assign. The operator could not trust the revision level on the control form because it was possible that the status of the document had changed between the time the document was submitted and finally approved. To assist the operator in making the right determination without the need to review prior paper documents, we added a cross-reference capability that allowed the operator to request the current status of all transactions records with the same document number. The cross-reference provided the operator with a brief history, which included such critical facts as whether a Temporary Change Notice (TCN) was in effect or what was the latest "approved" revision level.

Another outcome of the review was the realization that the record maintenance function, although logically set up for data entry and error correction, was not well structured for record termination. The information was arranged in a fashion that would require the operator to toggle screens to enter only a couple of pieces of information. I recommended a specialized "termination" function. This function was tailored to process terminations by asking a sequence of questions. The operator's response to each question determined what the next question would be. Thus, information that was only required if the document had been terminated as "approved" would not be asked if the document had been terminated as "disapproved".

Exceptions - Here Comes the Hard Part

We had a firm handle on the rules, so now was the time to determine all the exceptions to the rule. I asked questions to see where processing would deviate from the norm:

- When does a TRANSACTION not follow the "standard" TRANSACTION flow?
- When does a TCN not follow the "standard" TCN flow?
- When is revision B not really revision B?
- What "conditional" processing exists such as the "conditional approval"?

As the system analyst, it was imperative that I search deeply, for generally the operator responds to "what happens now" type questions with the process that most frequently occurs. I had to play the devil's advocate and probe into the possibilities of exceptions in all areas. Are there alternate processing paths based upon some condition? If so, what are the alternate paths and the criteria that specifies when they are taken?

Exceptions in any system add great complexity. Justified exceptions must be part of the automated system; however, I made a point of having Cynthia justify the need for the exception processing to insure that "standard" processing wouldn't work. Usually all exceptions cannot be removed from the processing flow. We must recognize which exceptions exist and must remain as part of the system.

In a manual system many exceptions are handled at the time the exception condition arises. Waiting until the exception occurs usually does not present any problem. Thus the operator doesn't have to admit exceptions could exist, what their probability of happening is, and what exception processing steps need to occur.

In an automated system, we must address all possible exception conditions during design. Some level of processing for the exception condition must be built into the system, otherwise a manual procedure must be in place to insure that it cannot occur. The analyst must be aware of all exceptions before the system is programmed. In an automated system, ignoring exceptions invites disaster. For example, in the manual tracking system, document revisions were indicated by assigning the letters of the alphabet sequetially, revision A followed by revision B, etc. The manual system hadn't assigned any revisions past D when it was under review. Up to this point there was no method for handling revisions past Z. The need for another revision indicator probably would not happen for a couple of years and could be addressed easily in a manual system when it occurred. For the automated system, this exception needed to be addressed NOW. All potential exceptions must be explored now, not when the system doesn't work because we failed to provide processing to handle to exception.

Track Implementation - The Big Payoff

At the time of implementation, there was only one operator and Cynthia to train. Having worked very closely with Cynthia during the analysis, design, construction and testing phases, very little training was required. Cynthia knew what she was getting and how it was going to work before the system was delivered. All I needed to do was show them how all the pieces fit together and explain how some of the logic functioned.

Cynthia now had an on-line document inquiry capability to review up-to-the-minute document status. The reports generated were available on request and provided current detail to control the day-to-day activities within her department. Now she had the answers for top management when they asked WHY?, WHEN?, and HOW LONG? Day-old information was a thing of the past.

I no sooner completed the project that I heard rumors of Phase II. As I had predicted, Cynthia liked what she had but saw the potential for TRACK to be more than just a tracking system. She was right!

Word Processing System Interfaces

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One way a work place can become more productive, cost effective, and efficient is for people to work together and cooperate. This same principle can be applied to word processing systems. The benefits to be gained from several stand-alone work stations can be considerably increased by connecting (interfacing) these work stations with one another and with other equipment.

There are four main areas where interfacing word processing systems with other equipment can improve productivity. These are:

1. Sharing files; this can save you from re-keying text or data that has already been entered into another word processor, a microcomputer, or a large mainframe computer.

2. Transmitting files via telephone lines; this may let you receive files from free-lancers and employees working at home, as well as other company offices. Here, you not only save yourself from re-keying data, you also save time and travel or delivery expenses. An additional benefit may be the ability to employ human resources that it would otherwise be impractical to use.

3. Automating typesetting; this saves you money because you don't need to pay for manual typesetting and it saves you time because you don't need to do as much proofreading.

4. Sharing peripheral equipment; this makes more effective use of equipment you may already have. Printers, plotters, facsimile devices, larger memory storage systems, and other specialized equipment seldom need to be in constant use by one work station. By sharing these resources more capabilities are made available to more individuals at a reasonable cost.

All of the above is very positive; however, there are some problems: interfacing equipment is not always easy, there are not many people available with experience in the area, and mistakes can be expensive.

Our panel will present an overview of the opportunities, the pitfalls, and the resources available to you.

Bob Drake, from Travenol Laboratories, Inc., will tell you about their Scientific Services Department's experience in interfacing an NBI 64 word processing system with a variety of equipment, including an IBM mainframe computer, several brands of microcomputers, and an automated typesetter.

Virginia S. Cram, from Sears Roebuck and Co., will present "Strategies and Pitfalls in Planning Equipment Interfaces," as a guide to help you better communicate with your company's technical personnel and with sales people. Copies of this paper will be available at the session.

Susanna B. Caton, from Applitek Corp., will discuss local area networks (LANs). Her presentation will include a description of what local area networks are, and how they can help us interconnect equipment and overcome incompatibility problems.

The last part of our panel discussion will be for your questions and, we hope, a lively discussion from which all of us can learn.

Local Area Networks and Their Impact on Technical Communications

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ABSTRACT

Local area networks are data communication systems that interconnect dissimilar devices to allow high speed data transfers among them. This paper first describes local area networks and some of their major components, and then compares them with PABX systems. Efforts by the IEEE and ISO to define standards for communications networks are discussed. Next, the major reasons for installing LAN's and their primary applications are presented. The paper concludes by suggesting some areas in which LAN's will affect technical communications and by discussing the limitations of current technology in the area of local area networks.

One of the newest buzz-words floating around the data communications and computer worlds today is LAN, an acronym for local area networks. Although the concept of local area networks has been around for over a decade, the present reality of automated offices and the proliferation of intelligent terminals and personal computers in all types of work environments has encouraged a new interest in networking systems. Computer manufacturers, large and small, have been rushing to assure their customers that they, too, have local networking capability. Their mini- and microcomputers, word processors and other devices often have data communications capabilities built in as standard features. New offerings of local area networks are being announced regularly, with IBM and Wang among the most recent companies to present their own LAN products.

In the near future, local area networks will be used to connect electronic equipment of all kinds into company-wide systems sharing common databases and equipment. Technical communicators who use word processors and intelligent terminals will be among the first to feel the impact of local area networks.

WHAT ARE LOCAL AREA NETWORKS?

Local area networks are data communication systems that interconnect dissimilar devices to allow high speed data transfers among them. Typically, local area networks are privately-owned and operate within a limited geographical area usually no more than a few miles in diameter. Devices that can be interconnected by LAN's include computers, terminals, computer peripherals like high-speed printers and plotters, and data and word processing equipment. LAN's also can carry video transmissions (cable television and security surveillance, for example) and voice communications (telephone and voice messages).

Local area networks offer full connectivity for every device on the network. That is, every device is potentially able to communicate with every other device. This is a radical departure from traditional computer technology which requires hardwired, point-to-point connections between host computers and their attached terminals.

The interconnecting link used by LAN's can be a physical cable such as twisted pair wire, broadband or baseband coaxial cable, or optical fiber cable; or it can be a free-space medium such as radio or infrared light beam. The most commonly used media today are twisted pair wire and coaxial cable. Twisted pair wire is the familiar narrow wire used in telephone systems, both public and private. Broadband coaxial cable is the same medium used by cable television.

The method, or procedures, by which devices on the network share the interconnecting link so they can transmit data to one another is called an access method. There are several different access methods in use today; each one, however, is more effective for certain applications, less effective for others. Without going into detail about their various features, the most common access methods are token passing and contention, usually called carrier sense multiple access, with collision detection (CSMA/CD). Ethernet, the result of the combined efforts of Digital Equipment Corporation, Xerox Corporation and Intel Corporation, is a well-known implementation of CSMA/CD. IBM's new network system uses a version of token passing.

LAN vs PABX

Private automated branch exchanges (PABX) and data switch systems offer services similar to those provided by local area networks, but they compare unfavorably with coaxial cable-based LAN's on several grounds. The first concerns data rates. A typical PABX can transmit data at up to 56,000 bits per second, while LAN systems using coaxial cable often support maximum data speeds in the millions of bits per second. In addition, coaxial cable combines its higher operating speeds with lower data error rates than twisted pair. Baseband and broadband cables are less susceptible to noise and interference than twisted pair, and can carry both digitized voice and data transmissions; broadband, in addition, can carry video transmissions.

Another factor in favor of local area networks is their physical configuration. PABX and data switch systems are centralized systems which require point-to-point connections between each device on the system and the central switch or controller. LAN's, which are distributed systems and not centrally controlled, usually use a bus or ring arrangement. These physical configurations require less wire than twisted pair. Also, adding devices to or deleting them from the network system are relatively easy.

STANDARDIZING LOCAL AREA NETWORKS

There still are no real, widely-accepted standards in the field of local area networks. Many different products using different technologies and offering different levels of service call themselves local area networks. The Institute of Electrical Electronics Engineers Project 802 technical committee has been working since 1980 to propose a set of LAN standards defining a general purpose local area network. The work of this committee is controversial because many people believe the technologies involved are too new and still evolving and that imposing standards at this point will stifle innovation.

A major problem in establishing one consistent standard for local area networks is the fact that there are a number of network products in the market, all still vying for dominance. Since no product yet has proved its superiority, each product's supporters are pushing to have their implementation selected as the standard. The IEEE has circumvented this problem by establishing three standards, each one using a different access method.

Another approach to standarization of communications networks was taken by the International Standards Organization when they developed an Open Systems Interconnection reference model. The ISO OSI model groups functions that should be performed by any network system into logical layers, but does not define how those functions should be fulfilled by a particular system.

THE NEED FOR LOCAL AREA NETWORKS

The astounding proliferation of electronic devices in all areas of business life has created environments that need the functions provided by local area networks. There are four major reasons for installing a local area network: for resource sharing, for providing a common interface between equipment of different types or manufacturers, for convenient distribution of hardware and for simplicity, flexibility and ease of expansion of the physical plant.

Resource sharing is one of the primary advantages offered by local area networks. All devices connected to the network implicitly have access to all other devices. Therefore, access is shared to high-speed printers, disk drives, long-distance telecommunications facilities, database management systems and other expensive resources whose cost could not be justified for a single system.

In addition to lowering costs, resource sharing is important from an information exchange basis. Common access to a single database means that everyone is using the same information, and updates and revisions are easily controlled. The advantage of this is immediately obvious to any technical writer who has spent hours trying to track down the latest revisions to a software product.

Local area networks also offer the ability to act as a common interface between dissimilar equipment. This advantage frees users from dependence on a single vendor's system and gives the company as a whole a tremendous savings in time and resources. A local area network also can integrate devices based on older technologies with newer equipment, therby extending the useful life of existing systems.

Local area networks allow the concept of distributed processing to be fully realized. Since local area networks remove the need for point-to-point connections between computers and terminals and other peripheral equipment, they allow the convenient distribution of hardware. Equipment can be located in the most efficient and reasonable locations within a facility, nearer their users, rather than kept in a central location. With a decentralized processing environment, a central host computer is no longer a potential source of total system failure since databases can be distributed throughout the whole system. Also, redundancy for applications that require a high degreee of reliability is provided easily within a local area network.

For high-growth companies that are adding both people and equipment at a fast pace, local area networks make expansion of the physical plant relatively easy. Once the wiring is in place, adding user devices to the network can be as simple as plugging them into a special wall outlet. And user devices can be moved from one physical location to another without rewiring and without reconfiguring the network.

APPLICATIONS OF LAN TECHNOLOGY

In the past, local area network vendors have targeted general business applications and office automation as their primary markets. General business applications include data processing, retail point-of-sale operations, management and financial planning and econometric modeling. In the area of data processing, LAN's are used to improve file access, storage and transfer as well as to provide resource sharing. They also provide computer-to-computer and computer-to-peripheral interfacing at close to bus speeds.

Office automation applications include document access, storage and transfer, electronic mail and message services, and word processor communications. LAN's also can provide the functions of the private telephone exchanges often installed in offices. As more offices invest in personal computers, LAN's will allow processor, storage and peripheral sharing among PC's. Common file access, transfer and storage as well as software development and distribution are issues that can be solved with local area networks.

Other applications that are seen as potential markets for LAN's include laboratory and factory automation and automated building management. Industrial automation in general requires local area networks to handle real time process control, CAD/CAM operations, and automated manufacturing and processing operations. Automated building management is a growing field and can include a wide range of functions, such as closed-circuit TV for in-house training programs and building surveillance, in-house telephone service, automated temperature control and lighting, and building security.

An application similar to building management is the armed services' use of local area networks for on-board interconnection of video, voice and data processing equipment on large ships and aircraft.

THE IMPACT OF LAN'S ON TECHNICAL COMMUNICATIONS

As the use of local area networks spreads, technical communicators will be among the first to appreciate their impact. The effect of sharing scarce resources like terminals, printers, computers and other equipment will be felt immediately in better turn-around times and general efficiency. The ease with which equipment can be moved from office to office, without the pain of rewiring and reconfiguring systems, also will save time and tempers. But the real impact of local area networks in technical communications will be caused by access to common databases and documents, increased storage facilities, and the greatly enhanced ability for file transfers. These advantages provided by local area networks will help in the creation of a wide variety of documents.

For example, a common database could be developed for each product that contains all the relevant information concerning that product. When different types of documents for the product are created, the common database is used as the primary source of information. In that way, marketing documents, specification sheets, public relations handouts and user manuals will all be talking about the same product, with the same features and capabilities - not often achieved in the real world! And as the product is revised and updated, the one common database is easily changed, too.

Another use of a common database could be in the development of master documents of two types. The first type of master document could be used to illustrate company-wide format and style standards. Each type of document the company produces would have a master document available on-line that could be copied and edited by the writing staff. This would encourage writers to adhere to a common format, as well as save them time and effort. Just think of the amount writer's block overcome by having the first sentence already written!

The second type of master document would be developed about one product and would be written in a format and style that would allow parts of the document to be copied and edited for different purposes. A general descriptive section could be used as a basis for marketing materials, while specific operating information would be decribed in varying levels of detail in other sections. Paragraphs or whole sections could be "cut and pasted" into other documents.

Potential access to all the devices on the network and the ability of the LAN to act as an interface between dissimilar equipment also will aid in the production of documents. Consistency between operators manuals and on-line documentation can be assured if the information in the manual, created on a word processor, can be transferred directly to the on-line documentation files on the computer. Files containing examples of software applications developed on the computer, can be transferred directly into the operators manual document on the word processor, doing away with the tedious typing (and proofreading) required to reproduce computer files.

If a company is large enough to support its own automated typesetting equipment, completed documents as well as revisions can be sent directly to typesetting from the word processor or terminal.

LIMITATIONS OF CURRENT TECHNOLOGY

Local area networks are the next step in the electronic revolution. The proliferation of computers, mini- and micro-computers, intelligent workstations, word processors, and other electronic equipment has radically changed our work as well as our working environment. But even as the electronic revolution solves one set of problems, it presents us with a new and different set. Local area networks are one solution to the data communications problems within individual companies, but they also must operate within the limitations of current technology.

Security is one of the greatest problems with using common databases, and allowing the almost unlimited access to them potentially available with local area networks. Everyone has heard of the teenage hackers who routinely enter supposedly secure systems and gain access to private files. Some form of encryption usually is proposed as the solution to security problems, but no simple, foolproof and inexpensive system is available yet. Most computer installations still rely on limited physical access and passwords to prevent unauthorized access, not the most sophisticated of approaches!

Another problem facing local area networks is that their interconnection abilities are potential, but not always realizable. The proliferation of equipment that makes LAN's necessary also makes their job incredibly complicated. Local area networks must provide conversion software to allow disimilar equipment to communicate. If the equipment is very different, the conversion software could get very expensive, in both development time and storage space. The gains may not justify the cost. Also, some conversions just may not be possible today given the tools available.

As technology develops, however, local area networks will continue to realize their potential as the backbone of the data communications industry.

Evaluating Word Processing Equipment

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This session is made up of three papers: "Display Units for Online Passage Retrieval";"Keystroke Comparison of Word Processors"; and "Word Processing Command Logic in Selected Popular Programs." The first paper discusses the different formats that online (stored and retrieved by computer) information can be retrieved; the second paper compares how many keystrokes different word processors require to perform certain tasks; the third paper compares word processing systems by comparing their commands and how they are defined.

The "technical" part of technical writing has traditionally referred to *what* we write. But in the computer age, it's beginning to refer to *how* we write as well. One of the most common methods used is with word processors, computers designed specifically for entering and editing text.

Imagine that you're a technical writer, or a manager of technical writers. Your manuals have always been produced with typewriters and typesetters, and you've decided it's time to enter the electronic age by purchasing a word processing system. How do you decide which word processing system to buy? Two papers in this category look at the evaluative process in different ways.

Ms. Lay's paper studies the problem from a purely objective viewpoint: She counts the number of keystrokes required to perform forty common word processor functions. She also compares the time required for word searches and document filing. While a keystroke one way or another might not seem to make much different, Lay discovered that some systems require up to 50% more keystrokes.

Dr. Stephen's paper evaluates word processors by a more subjective method. He compares the command logic of several different systems. For instance, some systems are line-oriented: commands must be executed on a particular line or range of lines. Others are page- or section-oriented: cursors are often used to indicate the area to be modifed. Dr. Stephen also studies the usability of mnemonic commands (such as using C for change) vs. commands with no verbal relation to their function.

The third paper in this section, by Dr. Girill, focuses on a system that eliminates paper entirely. Instead, the information is stored and accessed by computer. His paper discusses the most useful ways to display this information, and how they differ from the most useful ways to display printed information.

Whether you write, edit, or manage writers and editors, and whether you use a computer, word processor, typewriter, or ball-point pen, this session is sure to be interesting.

Display Units for Online Passage Retrieval: A Comparative Analysis

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Several computer services now let users retrieve passages online from the full text of books, statutes, or journal articles. The display units in which the text is packaged, however, vary greatly between systems, and these units heavily influence the quality of service. Four reader problems concerning printed books--finding where subjects are discussed, assessing how important each treatment is, linking scattered treatments of the same subject, and exploiting the text's organization--all have standard solutions involving widespread, time-tested indexing strategies. All four problems reappear in computerized passage-retrieval systems. But, in each case, structural display units (those based on format) prove much less successful than functional display units (based on content) in permitting the traditional solutions to work online too. Hence, functional units consistently support better access to online information than do structural units.

INTRODUCTION

Readers face four recurring access problems when they try to locate information in a book:

1. What subjects are treated here?
2. How can I find all the different treatments of the same subject?
3. How important is each of these treatments?
4. How are the treatments of each subject organized?

A good *index* solves these four problems by guiding readers to the book's subjects. For those who build indexes, each access problem presents a corresponding challenge in index design:

1. How can I identify a *subject* (i.e., an item worthy of being indexed)?
2. How can I control the *scatter* of index entries among synonyms or other alternative terms for the same subject?
3. How *exhaustive* should my index be--what threshold of importance must a subject pass to be included in the index?
4. How can the index reflect or preserve the *organization* of the book?

Indexers have perfected standard strategies for dealing with these recurrent problems, strategies that every good index incorporates.

Widespread use of computerized word-processing and phototypsetting equipment now yields, as a by-product, the *full text* of many books and articles online, in digital form. Such full-text databases automatically permit on-demand printing [17, Ch. 2]. They also invite readers with specific questions to search electronically for what librarians call "answer-passages."

To meet this growing need for effective answer-passage retrieval, computer programs with specialized search and display commands have recently developed [13]. Unfortunately, their choice of display units (the smallest text block they display) is often careless [18]. And this leads to trouble: the same four problems faced by readers and indexers of standard books re-emerge with online access to full text. But the new version of these old problems involves how a program's display units behave. Some display units support online counterparts of the standard solutions to these four problems. Others, however, fail to support, or even thwart, such transfer of strategies successful in the past.

In this paper I survey the kinds of display units available, and then show how the traditional indexing problems reappear regarding these display units. I compare the performance in coping with these problems of online access programs relying on different kinds of display units. By means of these comparisons I argue that "fully functional" display units prove consistently superior to all others in the quality of online access they support.

KINDS OF DISPLAY UNITS

The two basic kinds of online display unit are structural and functional. In structural units, the text format or syntactical features determine each unit's size and location. In functional units, size and location are set instead by text content or semantic features.

A page is a typical example of a fully *structural* display unit (see Fig. 1(a)) [3,21]. Page edges exist solely to divide text so it will fit onto sheets of paper for printing. Paragraphs [4,8] and screenloads [20] are other frequent structural units. Again, one locates them using format features (where the indents fall, or how many lines fit on a screen at once), rather than content features.

A keyword window (Fig. 1(b)) illustrates a fully *functional* display unit [5]. Such windows (each assigned a subject label or "keyword") start where some topic, theme, or information cluster begins. These units stop where the relevant discussion ends, regardless of document structure (see Fig. 2). Some contain only a few words; others span hundreds of lines crossing paragraph and page boundaries. Thus both their size and their location in the text reflect only content treated, not the format of the document [1,15,19].

One can also create hybrid display units. In these, unit size is a structural property while unit location remains functional. Keyword-in-context (KWIC) zones, which use a fixed number of lines [9] or words [16] centered around a specified string found in the text, have this dual character (see Fig. 1(c)). Hence, their behavior during answer-passage retrieval shares something with both purely structural and purely functional units.

FOUR RECURRENT ACCESS PROBLEMS

Passage Identification

A traditional index aims to locate (point readers toward) the *subjects* discussed in a text. Indexers must first identify these subjects amidst the background prose, then assign to each its appropriate index entries. Intuitively, subjects are

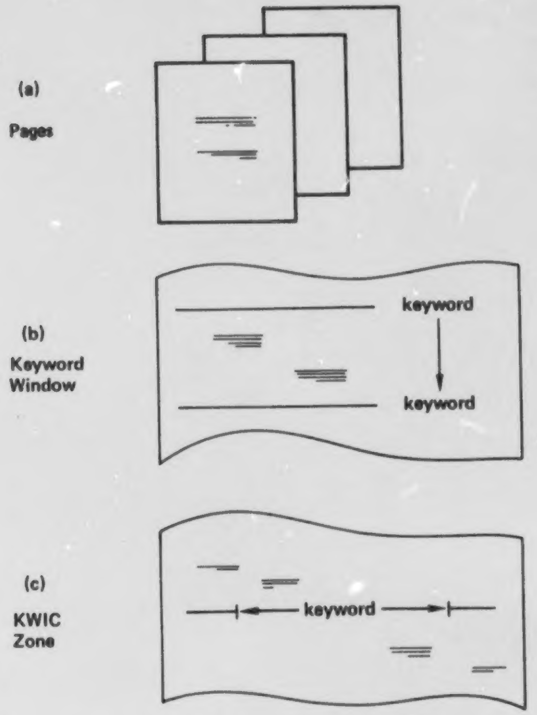

Fig. 1. Typical examples of the three kinds of display units for use with online text, including (a) *structural units*, where format defines size and location, (b) *fully functional units*, where content defines size and location, and (c) *partly functional units*, where content determines location but size is always the same.

a matter of content, of what a book is *about*. They are often characterized in terms of the "foci" [2, p. 142], subarguments and subplots [7, pp. 108–109], or themes [10, p. 13] that readers find useful.

A book's syntactic or structual features alone seldom prove adequate to identify its index-worthy subjects. Every indexing textbook, for example, explains why words (a prime syntactic feature) are neither necessary nor sufficient to locate subjects [2, p. 142; 14, pp. 78–79, 84–85; 6, pp. 73,75]. The word for a subject (e.g., 'trigonometry') is unnecessary to show where the subject occurs because sometimes a subject is thoroughly treated (e.g., in a section on SIN, COS, and TAN) even where the subject term itself never appears in print. Likewise, word occurrences are insufficient for locating a subject: the word for a subject sometimes occurs even without any corresponding discussion (e.g., the "negative mention" of 'graphics' in the sentence 'This section does not cover graphics').

The goal of answer-passage retrieval systems is to locate and deliver the full text of sought *passages*. This goal closely parallels that of a traditional index. The indexer's question

How can I identify a subject?

(since to point out subjects one must first find them) reappears as the online issue

How can I identify a passage?

(since to display passages for system users one must, again, first find them). As before, the intuitive answer relies on content and user interests—a passage is a unified stretch of text that answers a single question. Syntax and structural clues alone are no more reliable in locating passages than they were for traditional indexers looking for subjects.

The nonstructural character of passages, however, implies that they will *not* normally map directly into *structural* display units for easy online viewing. Figure 3 shows the problems. A display unit (such as a page) may contain (a) no passage whatever, or (b) a passage surrounded by irrelevant text, or (d) several independent passages answering different questions. Even more troublesome is case (c), where a passage

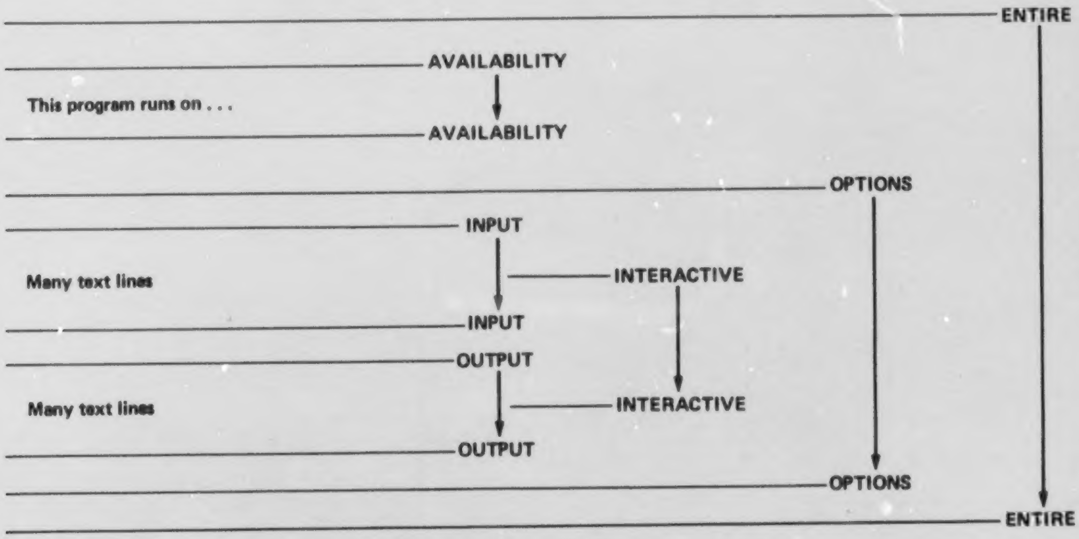

Fig. 2. Typical keyword windows, shown in simplified form in online computer documentation. The horizontal lines mark the start and end of each window. The matched pairs of keywords (e.g., OPTIONS) labeling these pairs of lines reveal the content of the passage flanked. Each window's size and location reflect the length and site of the passage within it. These units can nest (e.g., the INPUT window lies inside the OPTIONS window, which lies inside the ENTIRE window) and overlap (the INTERACTIVE window covers parts of both INPUT and OUTPUT) where content justifies.

crosses the structural edge of a display unit (e.g., a page break), so that no single unit can show all of it. Partly functional units, such as KWIK zones, are also prone to these same failings. In terms of information transfer, this mismatch between passages and structural display units is a serious disadvantage.

To overcome this drawback one can, of course, adapt the text to suit the units: many a technical writer earns their living editing passages to fit exactly onto pages or screens. This approach eliminates the mismatch, but only at the cost of introducing two further problems. First, such editing is a slow, demanding process, one that adds tight length and layout constraints to the already difficult task of creating clear technical prose. Second, it subordinates the text feature with highest user interest (i.e., content) to other features (pagination and format) with little or no user interest. From the *user's* viewpoint, this fix is just as illogical as rewriting a book to fit a prepared index instead of preparing an index tailored to the book.

Retrieval systems with fully functional display units avoid both the mismatch and the labored repairs. The size and location of these units always adapt to suit the passages that need display, not the other way around. The viewing problems pictured in Fig. 3 never arise (see case (e)). Hence, one need never sacrifice user interests nor burden writers to adapt content to format. For information-retrieval purposes, using functional display units thus provides the same relative benefits that a true subject index does over a simple word index.

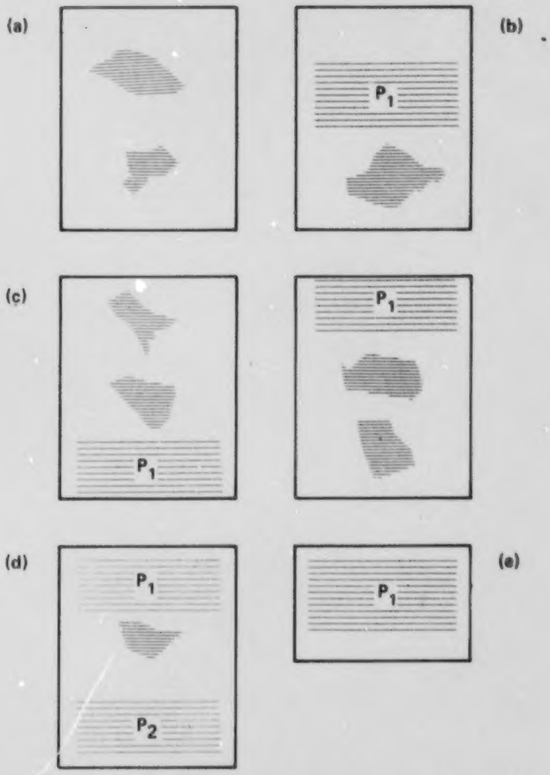

Fig. 3. Five possible relationships between text passages (marked P) and the display units with which they are packaged for online viewing: (a) *no* passage falls inside the unit, (b) *one* passage falls inside the unit, (c) one passage *splits* between two adjacent units, (d) *several* passages fall in the same unit, and (e) the unit fits one passage snugly, with neither stray text nor overflow.

Cross References

The second traditional indexing problem is *scatter* (an "unforgivable sin" according to [11, p. 92]). Scatter occurs when a subject is discussed in several disjoint places and receives a different index heading each time it appears. The greater the scatter the more often searchers will miss relevant information and the slower will be their attempts at recall, because pointers to related subjects are spread among synonyms throughout the index. For example, an index with references under both 'fiche' and 'microfiche', or under 'transparencies' as well as 'slides', has scattered related information.

This problem reappears online when scattered references point to related passages that fall into disjoint display units. Again, one needs a simple method to quickly find and then display all such related passages.

Cross references are the traditional method of scatter control [11, p. 97; 2, pp. 25-33]. They point from one index heading to another (see Fig. 4(a) and (b)). In this way index users who find any one of a synonymous set of headings find all of them, speeding their search and boosting their recall.

Just as cross references in an index lead to related subjects, so cross references in an online display system lead to related display units. The extent to which this quickly and completely shows related *passages*, however, depends heavily on the kind of display unit involved.

Fully functional display units maximize the effectiveness of online cross references in controlling scatter. These units, by definition, fit passages snugly. Hence any cross reference from one *unit* to another (perhaps by mentioning the keyword for the second inside the first) is just equivalent to a reference directly from one *passage* to another. Display of related passages is thus exact and complete.

Structural display units, on the other hand, minimize the effectiveness of online cross references (recall Fig. 3). Whenever several passages fall inside the *same* display unit, a cross reference to the unit only *inexactly* locates the desired passage. Whenever a passage spreads across several display units, a cross reference to any one of those units only *incompletely* locates the desired passage. In either case, quick and thorough cross reference is thwarted. The larger the structural units, the more inexact and incomplete are the cross references between them. Thus systems with structural units differ considerably from those with functional ones in

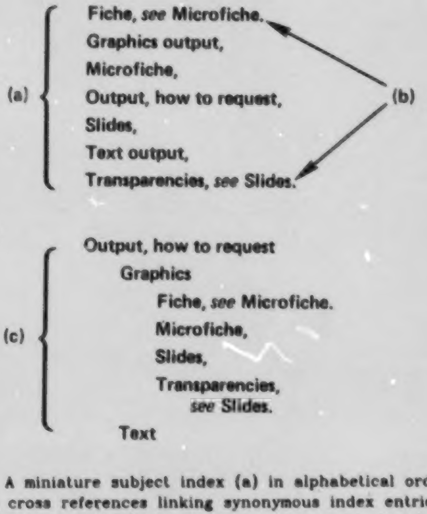

Fig. 4. A miniature subject index (a) in alphabetical order, (b) with cross references linking synonymous index entries to control scatter, and (c) in classified or hierarchical order.

the extent to which they support online versions of traditional scatter-control techniques.

Exhaustivity

Choosing the *exhaustivity* level at which to index a book is the third standard indexing problem [12, pp. 193-196; 1[illegible] p. 78]. One hopes to assign enough index terms to achieve thorough coverage of the text, yet one needs to avoid drowning pointers to important subjects amid a sea of references to trivia.

These concerns are reflected in the traditional questions
(a) Is every subject assigned its own heading, or should some be neglected as insufficiently important?
(b) How does one determine the threshold of importance for neglecting subjects?
For online information retrieval systems, these questions reappear in the form
(a) Is every passage assigned its own display unit, or should some be neglected as insufficiently important?
(b) How does one determine the threshold of importance for neglecting passages?
The usual basis for picking an "importance threshold" for subjects, and hence an exhaustivity level for indexing, is twofold: (1) the content of the text and (2) the extent of reader interest in the subjects covered. For instance (again see Fig. 4), in some books or for some audiences index entries for "slides" and "microfiche," besides the general one for "graphics," might be pointlessly exhaustive. Both features often vary markedly from one section to another. In a well-indexed book, the exhaustivity level varies with them.

In online systems with *structural* display units, however, the format of the text determines where the unit edges fall and thus how many are present. So which passages are neglected for separate display bears no direct link to either passage content or to reader interest. Display-unit exhaustivity is thus largely independent of *any* importance threshold for displayed passages. A further negative side effect is that writers here are no longer free to adjust exhaustivity to reflect changes in importance between sections. If exhaustivity levels vary at all, they shift only because of variations in format, not content, in the text.

Only fully functional display units preserve online the dual traditional criteria for exhaustivity level. Fully functional units alone permit writers to decide which passages deserve their own units without regard for predetermined structural boundaries. And they alone permit changing the exhaustivity level to reflect differences in reader interest for different parts of a document. Since their size and location are both content-based, these display units support online those solutions to the exhaustivity problem already proven effective offline.

Hierarchy

Solving the fourth standard indexing problem [7, p. 110] requires answering the question

> How can an index reflect the organization of subjects, as well as the subjects themselves?

A good book index must reveal not only the individual subjects discussed, but also the logical relationships in which they stand and the manner in which the author treated them. This benefits readers who already know about these relationships by providing faster and more complete subject searches, with fewer cross references. And it benefits readers unfamiliar with these relationships even more, by readily disclosing them and the author's viewpoints they often betray.

The traditional solution to this problem follows the advice of the ANSI indexing standard to "collect more specific headings under" more general terms [2, p. 49]. Sometimes called "precoordination" of the index terms, this approach gives the index a *classified* rather than a purely alphabetical order, as in Fig. 4(c) [14, pp. 80-81]. The relation of the index entries to one another then reflects the logical hierarchy of the subjects indexed.

This traditional problem re-emerges online in the form:

> How can an online access system preserve the organization as well as display the content of the passages it handles?

Simply re-creating an existing classified index in electronic form is insufficient for a successful solution: the ability to look at an online report of a document's structure is not enough. We need instead a way to exploit that structure to access relevant and avoid irrelevant information. This in turn presupposes display units able to stand in the *same relations* to each other as do the passages they display [22, p. 355].

Paradoxically, structural display units often fail to meet this condition. In theory they could--for example, with a hierarchy of sections and subsections. The most common structural display units, however, such as pages and paragraphs, have a totally flat structure. They cannot even overlap, much less contain other units (again, recall Fig. 1). No page, for instance, contains other pages within it. Since they stand only in a *sequential* relation to one another, they cannot mirror any logical hierarchy in the passages they display.

KWIC zones can at least overlap. But they too never contain one another (except perhaps by accident, when two are coextensive). Their structure remains basically flat, still preventing them from supporting hierarchical access to online text.

In contrast, fully functional display units support their own robust hierarchy. Keyword windows, for example, can not only overlap but they can also nest within one another to any degree (see Fig. 2). Hence narrow passages within broader ones can easily be packaged in windows contained inside larger windows. This hierarchy of functional display units lets readers move from unit to unit by tracing out the same relations (more and less general, not merely prior and next) that hold conceptually between the passages they are reading. Online systems with such units are uniquely able to "zoom" from small to inclusive passages to show logical context, or, conversely, from broad overview to narrow detail. Functional display units thereby support performance qualitatively superior to that of systems with structural display units, which lack true hierarchical access.

CONCLUSION

Functional text-display units (where passage *content* sets the unit size and location) help solve the online versions of four access problems long known to book indexers. Structural units (where document *format* sets the size and location) do not. Thus, although structural units may seem more natural, functional ones provide consistently better service to readers of online text.

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A full reference list is available from the author, either at the conference or by mail (space limitations prevent printing it here).

Keystroke Comparisons of Word Processors

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One of the most objective ways to compare word processors from the user's standpoint is to make a keystroke comparison which will determine (1) how many keystrokes it takes to accomplish common editing tasks, and (2) the number of key names required to perform the tasks. A comparison of the availability of programming functions, prompts, and status messages should be included in the keystroke study as well as a comparison of how long it takes the computers to perform common mobility tasks within documents.

WHO SHOULD EVALUATE WORD PROCESSING SYSTEMS?

Technical writers and editors who are familiar with several word processors know that some word processors are better than others for processing numerous, lengthy documents. Equipment changes can profoundly affect a publications department, particularly when a new word processing system is brought in which has fewer features and capabilities than the system previously used.

The publication departments of a company are usually the heaviest users of the company word processing system. Therefore the publication staffs should be included in the decision making process when a new system is being evaluated. Unfortunately, it is sometimes the company data processing programmers who alone decide on the purchase of an ideal data processing system that has a "satisfactory" word processing software package tacked on. The particular needs of departments that handle large amounts of lengthy documents are ignored. True, the copy emerging from two word processers may look the same, but how it got that way in each computer may be two different stories entirely.

The technical writers and editors at Evans and Sutherland Computer Corporation were asked to evaluate a word processor that would replace our large, dedicated word processing system with a word processing software package that could be used on the company's all-purpose computer terminals. We were told that a word processor that could be used on the inexpensive, all-purpose terminals would benefit everyone concerned -- most employees would have a terminal at their own workstation; the in-house computer people would have only one computer system to troubleshoot; employees could share in a computer mail network and could benefit from data processing as well as word processing features.

Managers asked three publications groups within the company to compare the two word processing systems. Because it is not my intent to promote one brand over another, in this paper I shall refer to the word processor we were already using as WP A and the word processor which was being considered as a replacement as WP B.

NEED FOR AN ORGANIZED PRESENTATION OF FACTS

Initial reaction to the new system was one of hostility and disappointment. Memos were written to supervisors stating that the new system was inferior to the established system: The new system didn't have this or that feature; too many keystroke sequences had to be memorized; the system was not satisfactory for processing long documents. One writer said that converting to the new system would be like trading in a Cadillac for a Model T.

A few managers complained that the writing groups were prejudiced and were not giving the new system a fair chance. They pointed out that several people in the company were satisfied with the new system. This was true. Those in the company who had never learned WP A were satisfied with WP B, and those who wrote only memos and short documents were not overly disturbed about the possibility of changing over. However, the writing groups and other heavy word processing users were extremely concerned about what they feared would lower the quality and volume of their work. The managers needed studies that objectively examined different aspects of the controversy. The memos and comments they had been receiving were a confusing mixture of opinion and fact.

KEYSTROKE STUDY

My department was determined to make an unbiased, objective evaluation of the two word processing systems and effectively convey the information to key managers, many of whom were unfamiliar with both the requirements of a publications staff and with word processing terminology. We decided to limit our study to the one aspect about word processors that was most important to us as writers and editors -- basic editing. For our evaluation, we compared (1) how many keystrokes it took for the operator to perform forty-four common editing tasks, (2) how many keystroke names were required for the study, (3) how many seconds the computers took to accomplish certain mobility tasks within documents, (4) and the availability of programming functions, prompts, and status messages.

We chose to make this comparison because we felt that the number of keystrokes that an operator needs to remember to perform basic editing tasks affects the time required for operator training and document entry and editing. In other words, it is easier to learn and remember a 10 keystroke sequence than a 15 keystroke sequence for an editing task.

To make our study easy to verify, we named the keystrokes and included the prompt statements each computer displayed. If we were able to shorten a keystroke sequence with a programming function (called glossary and user defined keys on our computers), we showed both the longer sequence and the shortened sequence. Table 1 lists the forty-four editing features that were evaluated. Table 3 shows the keystroke comparisons for five of the forty-four features.

The keystroke comparison included not only comparisons for basic editing tasks but also comparisons for cursor positioning and mobility within the document. We compared how many keystrokes were required to move the cursor to the beginning, end, or center of a sentence, line, word, or paragraph. We also compared how long it took the word processors to move the cursor through sections of text. Some of us had previously used word processors that were extremely slow in moving back and forth and searching through long documents. A slow word processor can be cumbersome to use, especially if one is a fast editor and typist. We timed the word processors on duplicate documents during peak usage times for both systems. Table 2 shows the results of our time comparison.

Before we distributed copies of the study to managers, we gave the study to the WP B expert in the company to verify our accuracy and make sure that we had "done justice" to the WP B.

KEYSTROKE COMPARISON RESULTS

Our keystroke comparison proved that WP B required 50% more keystrokes than WP A to perform the same basic editing and cursor positioning tasks. (WP B required 233 keystrokes; WP A required 157 keystrokes.)

The study also revealed that WP B required that the operator remember 50% more key names for common editing and cursor positioning tasks than WP A. (WP B required sixty different key names for the forty-four editing tasks in the study; WP A required thirty-nine different key names.)

CONCLUSION

Although the controversy about which word processor is best for the company is still going on at Evans & Sutherland, the publications departments have been allowed to keep the WP A system for an indefinite period. My department plans to do similar keystroke studies on other word processors under serious consideration. There is always the possibility that we may find a word processor that is as good or better than the one we have now.

My department evaluated the features of a word processing system most important to writers and editors-the basic editing features. The keystroke study did not cover other important considerations such as telecommunications, programming capabilities, and memory. Other groups made studies of these topics.

A keystroke comparison will not necessarily overcome computer configuration philosophies, brand preferences, and company politics. But a study like the one my department made will at least inform managers of the differences in word processor editing capabilities--differences that affect both operator entry time and operator training time. A company that produces heavy amounts of documentation would do well to conduct a keystroke study as part of word processor evaluation.

TABLE 1 - FEATURES COMPARED IN THE KEYSTROKE STUDY

- **Auto-replace**
- **Bold**
- **Cancel global search**
- **Cancel replace**
- **Cancel search**
- **Cancel selective replace**
- **Center**
- **Copy**
- **Copy from another file**
- **Cursor positioning**
- **Decimal tab**
- **Delete**
- **Footers**
- **Format (ruler) access**
- **Global hyphenation**
- **Global pagination**
- **Global replace**
- **Global search**
- **Go to page**
- **Headers**
- **Indent**
- **Insert**
- **Justification**
- **Limit global replace**
- **Move**
- **Move from another file**
- **Note/comment marks**
- **Page break**
- **Paste buffers**
- **Printing**
- **Replace**
- **Required page break**
- **Required space**
- **Reverse search**
- **Search**
- **Selective replace**
- **Strikeover**
- **Subscript**
- **Superscript**
- **Tab**
- **Temporary place marker**
- **Transpose**
- **Underline**
- **Upper/lowercase change**

TABLE 2 - TIME STUDY (in seconds)

FEATURE	WP A seconds	WP B seconds	FASTER WP
Mobility on a Page			
From bottom of page to top of same page	1	8	WP A
From top of page to bottom of same page	1	7	WP A
Mobility Within a Document			
Backing up one page	0.5	8	WP A
From top of document to top of page 5	1	8	WP A
From top of document to bottom of page 5	1	10	WP A
From top of document to bottom of page 60	2	100 (1:40 min.)	WP A
From bottom of document to top of page 1	1	100 (1:40 min.)	WP A
Search through 60 pages	73 (1:13 min.)	155 (2:35 min.)	WP A
Filing a 60 page document	1	25	WP A

TABLE 3 - KEYSTROKE COMPARISON (Sample)

	WORD PROCESSOR A			WORD PROCESSOR B		
FEATURE	# KEY-STROKES	KEYSTROKE SEQUENCE	PROMPTS/STATUS MESSAGES	# KEY-STROKES	KEYSTROKE SEQUENCE	PROMPTS/STATUS MESSAGES
SEARCH	3	SEARCH type text EXECUTE	Search for what?	4	GOLD SEARCH type text RETURN	Enter text:
GLOBAL SEARCH to find first instance	3	SHIFT/SEARCH type text EXECUTE	Search for what?	6	GOLD T GOLD SEARCH type text RETURN	Enter text:
to find next instance	1	EXECUTE		2	GOLD CONTINUE SEARCH	
COPY	5	COPY highlight EXECUTE move cursor EXECUTE	Copy what? (Rearranging) To where? (Rearranging)	7	SELECT WORD, LINE, etc. CUT PASTE ADVANCE WORD, LINE, etc. PASTE	(No Prompts or Status Messages)
MOVE	5	MOVE highlight EXECUTE move cursor EXECUTE	Move what? (Rearranging) To where? (Rearranging)	6	SELECT WORD, LINE, etc. CUT ADVANCE WORD, LINE, etc. PASTE	(No Prompts or Status Messages)
COPY FROM ANOTHER FILE BETWEEN DOCUMENTS	6	SHIFT/COPY document # move cursor EXECUTE highlight EXECUTE	Document: Searching From where? Copy what? Rearranging	34 (12 using User Defined Keys-UDKs)	SELECT or, w/UDKs, text CUT PASTE GOLD MENU P B SPACE S A V E RETURN RETURN GOLD FILE E SPACE Title RETURN ADVANCE WORD,LINE,etc. GOLD MENU P B SPACE R E S RETURN RETURN PASTE	(No Prompts or Status Messages) SELECT text GOLD 1st UDK #) UDK document # RETURN ADVANCE WORD, LINE, etc. GOLD 2nd UDK # UDK
TOTAL NUMBER OF KEYSTROKES (entire study)		WP A - 157 WP B - 233 (50% more than WP A)	TOTAL NUMBER OF KEY NAMES REQUIRED (entire study)		WP A - 39 WP B - 60 (50% more than WP A)	

Word Processing Command Logic in Selected Popular Programs

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Word processing programs are often compared on the basis of number of keystrokes. This paper suggests that command logic may be a more significant comparison basis.

The paper identifies word processing logic as spatial, mnemonic, or tiered; combinations of these patterns may also be found.

A study of five popular programs for three popular microcomputer systems reveals diverse logic.

A logical approach suiting one person may be anathema to another, distracting that person from the business of writing. Given similar capabilities of many programs, users may benefit from being able to choose a program on the basis of a comfortable logic.

INTRODUCTION

Purpose

We hear a lot of comparisons of word processing programs today. Many of these comparisons center on the notion of the number of keystrokes to command a particular function. The idea behind such studies is that more keystrokes require more time. This paper is concerned not with the number of keystrokes to perform a certain function, but with which keys must be struck. It considers the logic underlying the commands, and suggests that a user who understands and flows with the logic of the commands is an efficient user.

Scope

Five well-known word processing programs for three popular personal microcomputer systems will be considered: Screenwriter II and PIE Writer for the Apple II+, WordStar and Perfect Writer for CP/M-based microcomputers, and SCRIPSIT for the Radio Shack TRS-80 Models II, 12, and 16. (Credits for these and other registered trademarks referred to in this paper will be listed at the end.)

Summary

Command logic, it will be seen, can be spatial, mnemonic, or tiered to different program levels. Programs may also combine some of these patterns, or function according to a logic all their own.

Different kinds of command logic may appeal to different people. There may, however, be a relationship between command logic and both ease of learning and ease of use. And a seemingly random command logic, or a logic not suited to the user's way of thinking about writing, may involve considerable memory work or a well-thumbed reference manual. Either of these situations can detract from the user's efficiency.

WORD PROCESSORS AND THE WRITER'S THINKING

New Thinking Patterns or Not?

Certainly computers are still new to a lot of people today. And word processors are still foreign territory to many people who write. When these people start using these new tools, will they have to change their way of thinking about writing, or will they be able to transfer to their word processors their present approaches to writing?

Cursor Movement

Persons coming from handwriting technology may be accustomed to moving their pencil hand directly to an error to erase text. Persons moving to word processing from a correcting electric typewriter are accustomed to moving their right hands to the correcting key for backing up to and correcting typos. What makes more sense for these people when they want to move the cursor around in a document on a word processing screen: pressing an arrow key pointing in the desired direction, or pressing some combination of CONTROL and other keys?

Programs that require a combination of CONTROL and other keys for cursor movement require an additional adjustment of thought and of hand control. Depending on the program, the user may be required to hit two keys simultaneously under the left hand after moving the fingers away from the home keys, or to use both hands to hit the required combinations of keys.

If a program's command keys are mnemonic, learning which ones to strike should be fairly easy. If the commands are not mnemonic, the user must learn some seemingly random commands. In still other programs, the user may be asked to view the keyboard in a new way: as a spatial chart, so to speak, divided up into quadrants and directions.

Scrolling

Persons coming from any paper-based writing background, be it typing or handwriting, are likely to be page oriented. Indeed, paper pages are still the output of word processors. It is important, therefore, for the user of a word processor to be able to easily access blocks of text if not by pages then at least by screens, and to be able to ascertain relative locations by means of indicators in the command line.

The ease of scrolling up and down (or forward and backward) in a text file can make a big difference in user satisfaction or frustration. Ideally, the scrolling commands should be extensions of the cursor movement commands, so that the user needs to think only of more or bigger moving, not of a totally different kind of moving.

Editing

For a careful writer, editing text is more important than writing the first draft. The ways a word processor allows a writer to move around in the text and to make typeovers, insertions, deletions, and block moves can make a difference in that writer's satisfaction and production levels.

The way a program identifies a block of text to be moved affects the user's efficiency. Most writers' sentences do not occupy precisely one line of the computer screen. But if the program can identify units of thought--e.g., sentences and paragraphs--the editing job can be greatly simplified.

Formatting and Printing

When it comes to formatting and printing text, a division exists among proponents of screen-oriented word processors and of character-oriented word processors. Writers for whom the appearance--the shape, the layout, the format--of the document is part of the creative process will want to insist on screen-oriented word processors, in which what you see is what you get. Such writers may be frustrated by a character-oriented program that requires the embedding of strange formatting commands, no matter how powerful those commands may be. On the other hand, writers who regularly use boilerplate formats may be perfectly satisfied with a character-oriented program.

SUMMARY DESCRIPTIONS OF SELECTED PROGRAMS

The examinations of the five selected programs will begin with a general observation of the way they work. They will then be examined from the point of view of the user's most common activities: moving the cursor and scrolling; editing; and formatting and printing.

SCREENWRITER II

General

Screenwriter II is a character-oriented program. It uses tiered logic, with the primary functions of editing and printing clearly defined as separate programs. Commands within the subprograms are mnemonic.

Cursor Movement and Scrolling

The cursor can be moved left and right using the Apple II+'s left and right arrow keys; since the Apple II+ does not have up and down arrow keys, up and down cursor movements are achieved with ESCAPE CONTROL A or CONTROL A, respectively. (A modified version for the new Apple IIe might take advantage of that computer's additional up and down arrow keys.) CONTROL P scrolls forward one screen (or "page") and ESCAPE CONTROL P scrolls backward one screen or "page."

Editing

Within the editing program, a command level is accessed first; from here, the user can press I to go into an insert mode, or C to go into a change (or typeover) mode. Block moves are handled by identifying the beginning and ending of the block and commanding a move with or without deletion of text at the original location. The commands are, respectively, CONTROL D for deleting text at the original location and CONTROL G for getting text but keeping it at the original location.

Formatting/Printing

Within the printing, or RUNOFF, program, commands at sublevels are mnemonic: B for begin printing, C for continue printing, J for eJect page, I for ignore commands, S for stop at file end, T for test print.

PIE WRITER

General

PIE Writer is a character-oriented program. It also uses tiered logic, with the editing and printing programs clearly separate functions and with a command level to go through to get into the editor.

Cursor Movement and Scrolling

Cursor movement follows spatial logic by using the CONTROL key combined with certain keys arranged in a diamond pattern on the standard QWERTY keyboard. The keys of this diamond are E, S, C, F, for up, left, down, and right movement, respectively. (A version for the Apple IIe takes advantage of that computer's cursor movement arrow keys.) Other cursor and scrolling functions within the editing program offer mixed logic, requiring memorization to learn: CONTROL G moves the cursor one tab stop to the right, and CONTROL A moves it one tab stop left. CONTROL V (visually suggesting downward direction) advances the screen 21 lines, CONTROL R reverses it 21 lines, CONTROL N advances the cursor and screen to the next line, and CONTROL Y reverses the screen and cursor one line at a time.

Editing

The editing commands require straight memorization. For example, CONTROL P puts the program into the insert mode. CONTROL J deletes a character at the cursor, CONTROL SHIFT N deletes a word at the cursor, and ESCAPE CONTROL SHIFT N deletes a line at the cursor. Block moves are accomplished with ESCAPE nn CONTROL L, which copies the specified number of lines into memory; CONTROL O retrieves them.

Formatting/Printing

Commands in the printing, or FORMAT, program are essentially mnemonic. They include, for example, such commands as .nf for no-fill, .fi for fill, .sp for space, .pi for paragraph indent, .ps for paragraph spacing modification, .ls for line spacing, .bl for blank lines.

WORDSTAR

General

WordStar is a screen-oriented program. It's editing logic is basically spatial; in the formatting and printing functions, it has mnemonic commands.

Cursor Movement and Scrolling

Cursor movement is achieved by using the CONTROL key combined with certain keys arranged in a diamond pattern on the standard QWERTY keyboard. The basic keys of this diamond are E, S, X, and D, for cursor movement up a line, left a character, down a line, and right a character, respectively. (Note that if your keyboard has cursor movement arrow keys, these keys may or may not be enabled when you are running WordStar.) The diamond is expanded for larger movements: CONTROL with A or F moves the cursor left or right one word. Scrolling is accomplished by further expansion of the diamond: CONTROL with W, Z, R, or C causes scrolling down a line, up a line, down a screen, or up a screen, respectively. Some of the above functions are multiplied, as it were, by going through CONTROL Q first; e.g., CONTROL QW produces a continuous downward scroll, CONTROL QZ a continuous upward scroll.

Editing

Block moves are accessed through the CONTROL K menu, with the succeeding keystroke specifying some aspect of the block: B for beginning marker, K for end marker (following left-to-right spatial logic). W, for writing to file, is mnemonic; Y, for deleting, is not.

Formatting/Printing

Print control characters are accessed through the CONTROL P menu, with the succeeding keystroke specifying the desired function. Some of these succeeding keystrokes are mnemonic, some are not: A for alternate and B for boldface are mnemonic; H for backspace, M for carriage return, and J for line feed may require memorization. The print dot commands are mnemonic, as indicated by the following random samples: .lh for line height, .pl for paper length, and .OP for omit page numbers.

PERFECT WRITER

General

Perfect Writer is a character-oriented program. It's editing program uses basically mnemonic commands. Its formatting commands use a formatting code followed by English words.

Cursor Movement and Scrolling

Cursor movements by character are made by pressing CONTROL with F for forward, B for backward. ESCAPE with F or B moves the cursor forward or backward a word. CONTROL with P or N moves the cursor to the previous or next lines, respectively. ESCAPE with P or N moves the cursor to the beginning or end of the paragraph. Cursor movement arrow keys also will work.

Scrolling forward is done with CONTROL V, pointing in the direction of movement. Scrolling backward is done with CONTROL Z. CONTROL A, to move the cursor to the beginning of a line, follows spatial logic.

Editing

Some editing commands are CONTROL with D to delete a character, or with K to kill to a line end, O to open a line. Blocks of text may be identified as regions with beginnings and endings marked. Also, paragraphs may be defined by placing the cursor anywhere within the paragraph and pressing ESCAPE H (which is not a mnemonic command). Blocks of text are put into a memory buffer with CONTROL W for wipe screen and recalled with CONTROL Y for yankback.

File manipulation is done with commands from the CONTROL X (for eXtended) tier, followed by, for example, CONTROL S for save, CONTROL R for read, and CONTROL P for print.

Formatting/Printing

Formatting and printing commands are embedded in the text with an @ sign followed by English words. Some examples include @Style(parameters) for page formatting, @Index for entries to be indexed, and @Foot for footnote text. Perfect Writer also features numerous standard, stored formats to cover virtually every writing situation, thus freeing the user from having to define formats for every document.

SCRIPSIT

General

SCRIPSIT is a screen-oriented program with the editor and formatter available simultaneously. It's mnemonic commands operate out of tiered program levels which are themselves accessed mnemonically.

Cursor Movement and Scrolling

Cursor movement is done with cursor movement arrow keys; extended cursor movement and scrolling are achieved by holding the REPEAT key with the desired arrow key. Express cursor movement is accomplished by pressing the HOLD key with one of the arrows. Entire pages are accessed by pressing CONTROL with P for previous page or N for next page.

Editing

Blocks of text are defined by pressing CONTROL D for the define tier of the program, followed by the mnemonic command describing the amount of text to be defined: C for character, W for word, S for sentence, P for paragraph, A for above the cursor, and B for below the cursor. Words, sentences, and paragraphs can be defined from anywhere within the unit to be defined. After text is so defined, what to do with it is then commanded with the mnemonic commands D for duplicate or M for move, or with a special function key, F2, for delete. Text to be recalled from the duplication or move buffer is brought back by CONTROL R for recall. The insert mode is accessed with F1, another special function key.

Various other functions are accessed from the Utility tier of the program, called up with CONTROL U. From there, mnemonic commands access the various utilities: S for spelling check, M for merge, N for numbering--or renumbering--pages, R for repaginating, U for unediting the most recent changes, D for deleting selected pages, C for converting to ASCII or merge files, A for assembling multiple documents, and P for printing. Each of these functions is then executed through its own menu, with prompts provided at all stages.

Formatting/Printing

Formats may be adjusted visually and at will from the format tier, accessed with CONTROL F for format. Text appears on screen in the specified format, so that what you see is what you get.

Print control is via a menu, with defaults that can be accepted, overridden, or redefined from the program's utilities. Since the program is screen-oriented, no printing dot commands are needed. Special print codes for, say, foreign language symbols, are user-definable and commanded through the CONTROL X (for extra) tier.

CONCLUSION

Writers can benefit from knowing the logic of a word processing program and comparing it to their own approach to writing. With the word processing logic that is right for them, writers can move into word processing without a lot of re-thinking of their writing process. With an incompatible program logic, writers may have painful readjustments to make.

Sense can be made out of the bewildering variety of word processing programs available today if the logic of a program's user interface is considered. This is the area that users must live with in their daily running of the program and in their creation of documents. Knowing the logic of the program can go a long way towards finding a compatible interface.

References

(Screenwriter II is a registered trademark of Sierra Online Systems; PIE Writer is a registered trademark of Hayden Software; Apple II+ and Apple IIe are registered trademarks of Apple Computer Inc.; WordStar is a registered trademark of MicroPro; Perfect Writer is a registered trademark of Perfect Software, Inc.; CP/M is a registered trademark of Digital Research, Inc.; SCRIPSIT is a registered trademark of Tandy Corp.; Radio Shack is a division of Tandy Corp.)

Publishing Secure Technical Literature with a Small Writing Staff

Susan Page Estes and Andrew Rojecki, Moderators

Session Summary

The purpose of this session is two-fold. First we will show how a network-based office system performs all the processes for creating finished documentation, allowing a small writing staff to create camera-ready pages without the aid of outside illustration, design, and typesetting services, thus ensuring security. We will use the Xerox STAR, an example of such a system, to demonstrate these steps, which include (1) **writing/editing**, (2) **designing**, (3) **illustrating**, and (4) **typesetting.**

Second, we will discuss how technical communicators can use modular, network systems like this to centralize the publications process, ensuring consistency of information, eliminating redundancy, and preserving security.

Likely interested participants are:

(1) technical communicators working in high security environments.
(2) graphics designers interested in electronic page design.
(3) managers interested in information systems that can tap into existing data networks or in systems that can centralize information for gathering and communicating in a finished form.
(4) any managers and writers interested in a system that gives them nearly total control over the publications process.

We will also invite people to try their hand with the two workstations XEROX plans to deliver to the session.

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Publishing Secure Technical Literature with a Small Writing Staff

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Abstract

When a small technical writing staff is presented with the task of preparing professional documentation for a large research and development group and the writers are further limited by security requirements, they need a self-contained tool that allows them to play more than one role in the production process. This paper focuses on how an office system performs as an electronic publishing house.

The discussion centers on the qualities of the Xerox STAR that allow the user to perform effectively as writer, editor, illustrator, designer, and keyliner while maintaining high security. Special emphasis is given to the traits of this particular electronic device that make it attractive to the user: its transparency, its visual feedback, and its encouragement of experimentation and creativity.

THE PROBLEM: PUBLISHING SECURE TECHNICAL LITERATURE WITH A SMALL WRITING STAFF

The Environment

The technical writing group at R.R. Donnelley & Sons Company, a large commercial printer, serves a corporate applied research and development division that designs and implements software and hard-ware systems for the manufacturing divisions. Our task is to provide the instructional and reference literature on these systems for a number of audiences--engineers, technicians, operators and sales.

While our roles in the research and development process are not unique, our work environment imposes unusual conditions: a small staff (three writers) and high security requirements.

The first condition results from the newness of our group--only three years in existence; the second from the company's large investment in original applied research and development. We are expected to produce high-quality documentation and keep its sensitive contents confidential, an extremely difficult task if performed in the conventional way.

The Conventional Publishing Process

Publishing a document includes several stages of preparation before it goes to print: It must be **written** and **edited**, **illustrated**, and **typeset**. If the document is to be visually appealing and easy to read consideration must also be given to a **design**. In the conventional process each of these publication stages is performed by a skilled professional trained to do that one task. Because of our small staff and the security restrictions that prevent us from sending the work to outside art, design, or typesetting houses, we need a tool that is versatile enough to allow us to perform our roles as writers and editors as well as giving us the capability to do illustration and design work.

THE SOLUTION: AN ELECTRONIC PUBLISHING SYSTEM

Fortunately there are now available electronic systems that permit a small staff to carry out the whole publishing process from initial drafts to illustrated, camera-ready copy. There are many such systems, some designed for newspapers, others for magazines, most much too large or too concentrated on a particular function for the scope of our task. We have instead adapted a system designed primarily for office work--the Xerox STAR--and use it to create camera-ready documents.

The Xerox STAR

The Xerox STAR System allows us to perform all the tasks necessary for creating finished pages, thus neatly filling our twin demands of versatility and security: it allows us to perform all roles--writer, editor, designer, illustrator, typesetter. And because we do play all these roles, the documents never leave the secure environment of the research and development area.

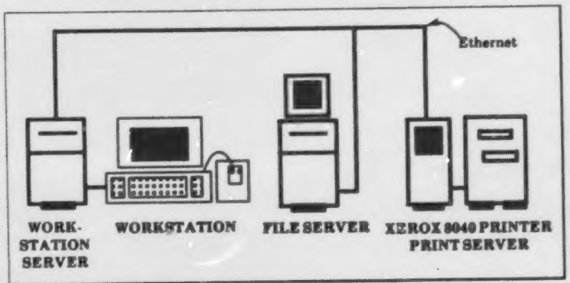


Figure 1. The STAR System.

As illustrated above in Figure 1, the STAR system includes the following:

1. A **workstation** complete with a high-resolution crt, a keyboard with special function keys, and a "mouse" electronic pointer that selects text, controls the placement and sizing of illustration elements, and triggers administrative functions such as pagination and printing. The crt shows the page image precisely the way it appears when printed, allowing the user to typeset "on the fly."

   Each user stores his or her files on a "desktop," an electronic library whose contents appear as cartoon-like icons on the screen after logging onto the system. Documents can be transferred or copied to other user desktops with an electronic mail feature.

   The workstation is run by a microcomputer (Workstation Server) that accesses memory containing the text entry and graphics software.

2. A **File Server,** a device that contains a microcomputer and a hard disc. The memory stores the administrative programs that link the elements of the system and the user files. The file server permits someone designated as "system administrator" to control access rights to all files, thus ensuring security.

3. A **Laser Printer** that prints the pages precisely the way they appear on the workstation crt. The printer is plugged into a microcomputer (Print Server) that communicates with the rest of the system. The server's memory stores a number of type fonts as well as the software necessary to send data to the printer.

4. An **Ethernet** cable that links the components and permits the microcomputers to exchange signals and data with each other.

How the System Facilitates the Task . . .

The system allows us to perform all roles necessary for producing finished pages without calling undue attention to itself. The special working qualities of the system (and the criteria one might use to judge the usefulness of any other such system) that have made it a useful tool for us are:

1. Its **transparency**: no special knowledge of computers is required to make it work effectively.

2. Its **visual immediacy**: when the user creates graphics or changes typesetting formats, the results appear instantly on the screen. Moreover, the elements on the screen have a 1:1 correspondence with their appearance on the printed page.

3. Its **encouragement of experimentation and creativity:** the system does not penalize the user with time-consuming processing.

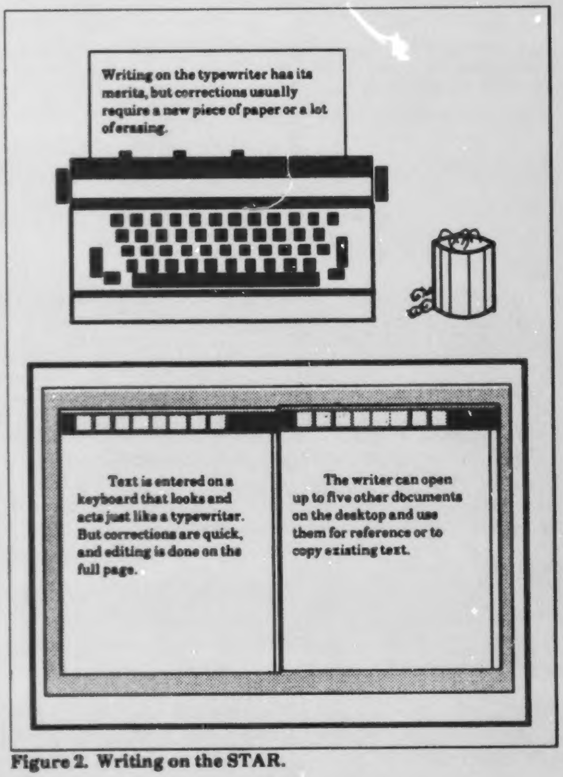
. . . for Us as Writers/Editors. The STAR has all the features one expects from a word processor, such as **copy, move,** and **find and replace** functions, as well as two powerful features: (1) **full-screen editing** and (2) a **1:1 visual representation** of what the final copy looks like.

The **copy** and **move** functions are triggered by highlighting the chosen text with the mouse and then pressing the appropriate function key. The mouse is then used to point to the destination for the chosen copy. The **find and replace** function is called up by a special function key that displays a menu in which the key phrase or word is placed.

The **full-page display** shows the finished page much as a sheet of paper in a typewriter (see Figure 2), enabling one to see the writing in total and be able to follow the progress of ideas from paragraph to paragraph.

Also of importance is the STAR's ability to show up to six documents at a time. References are easily made and text can be copied from any document displayed. This, again, encourages experimentation and changes which make our finished work more ambitious and imaginative than it might otherwise be if we were either intimidated by a complicated electronic device or put off by a clumsy machine that makes editing a tedious chore.

The **security** issue is met by the STAR's ability to mimic a teletype terminal. Project designers enter their documentation on a mainframe computer which can be linked to the STAR with a modem. Moreover, each writer has a password that opens his or her desktop. No one can get into a writer's desktop without that password.



Writing on the typewriter has its merits, but corrections usually require a new piece of paper or a lot of erasing.

Text is entered on a keyboard that looks and acts just like a typewriter. But corrections are quick, and editing is done on the full page.

The writer can open up to five other documents on the desktop and use them for reference or to copy existing text.

Figure 2. Writing on the STAR.

. . .for Us as Illustrators. The STAR's graphics features enable even unschooled illustrators to produce reasonably accomplished illustrations with little more than a rough idea of what they want to do.

The STAR supplies basic geometric shapes--rectangle, triangle, circle, ellipse--as well as lines and curves. These forms have what the system calls "properties," elements that define the thickness and structure of lines and the shading and texture of shapes. The shapes can be magnified or shrunk to any size.

In addition, the STAR's ability to draw curves of varying length and apexes gives us the ability to do some limited "freehand" drawing. Together with the geometric shapes, these graphic features enable us to "draw" all the illustrations we need to make our points visually. Figure 3 shows some of the STAR's graphics features.

Because of the system's COPY function, it is possible to draw a basic illustration, copy it, and then elaborate on the copy. This prevents irreversible overworking of a sketch and allows us to experiment without fear of destroying the original. And as the illustrations are stored electronically, they can easily be recalled and corrected whenever there are engineering design changes.

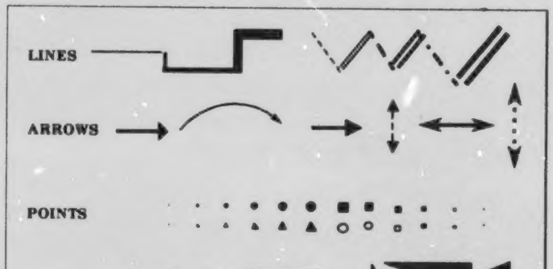


Figure 3. STAR graphic elements.

. . . for Us as Designers. The design of a manual is as important to us as is the text within it. Our readers are less than enthused at the prospect of reading technical descriptions. Part of the way we handle this problem is by paying special attention to our writing style: keeping it brisk, being personal, and adding some humor whenever possible. But the key is making the reading material visually inviting, by paying special attention to its **design.**

Becoming an accomplished book designer without formal training is impossible even with the best of tools. But the flexibility and ease of experimentation with the STAR permits us to shape designs with only rudimentary knowledge of design principles. For example, we try to balance text with an equal amount of white space; we keep the type page width to length ratio at roughly 1:1.4; we limit line length to 65 characters; and increase leading when we use a non-serif face.

Using these simple design guidelines, we experiment with the STAR's formatting features to create a variety of page layouts. Thus we can change the page design depending on the subject matter and the target audience. For example, when writing for technicians, we use a two-column format, one for text descriptions and one for annotations for further reference details. For operators who need to step through a complicated procedure we use a horizontal page format that enables the manual to be secured on its side in a flip-chart manner.

The STAR only offers a limited number of fonts, but we vary type size for different levels of headings, use boldface and italics for emphasis and visual relief, and insert illustrations whenever possible to substitute for text.

The STAR permits these design changes through special function keys and menus that alter page dimensions, margins, fonts, and leading. The options selected can be seen immediately on the screen by using the **APPLY** feature. If we are dissatisfied with the results, we may make another choice and again see the results immediately. In this way we triangulate in on the desired end and lock it into place when the balance between type, page, illustration, and white space is achieved.

. . . for Us as Keyliners. Making the mechanicals for illustrated pages consumes more time and materials than most other steps in conventional document production. For example, the boards and the overlays must be purchased, marked, and cut to size. After the overlays are secured to the boards, the corner marks have to be drawn in. If the entire board is to be reduced or enlarged, calculations must be made to size it to the desired page dimensions.

Next the artwork has to be mounted on the board. Any text has to be stripped in either on the board or on the appropriate overlay. For instructional work, step numbers have to be inserted along with arrows and both arrows and numbers must be sized for the final reduction or enlargement. Then borders or rules are drawn and the folios added.

With electronic page layout, most of this manual layout work is eliminated (see Figure 4). The page size on the screen is the same as it will be when finished, so there is no guessing about the appearance of the final page. Illustrations can be magnified or reduced to fit existing space. Text can be inserted on the page along with graphic elements and arrows can be drawn in and maneuvered to any position.

By using the electronic move and grid functions of the STAR it is possible to simultaneously lay out a page and balance it for visual appeal without erasing arrows, regluing text, or having to imagine the finished page dimensions.

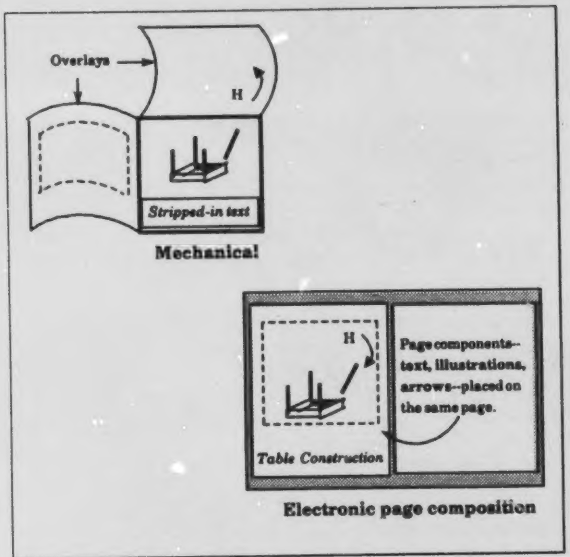

Overlays
H
Stripped-in text
Mechanical
H
Page components--text, illustrations, arrows--placed on the same page.
Table Construction
Electronic page composition

Figure 4. Mechanical and electronic page composition.

CONCLUSION

In this paper we have described how an electronic office system serves our publication needs for autonomy and, therefore, security. There are, however, capabilities in a network system like the STAR that also make it a useful tool for an organization with far-flung information resources.

An ethernet network links the various departments and office staffs, providing a common path to central file storage. System developers can store specifications, memos, and rough illustrations; the technical writing staff can call these files up and assemble them into finished documents. In this way the network system serves as a common reservoir for information for the whole organization, ensuring consistency and integrity.

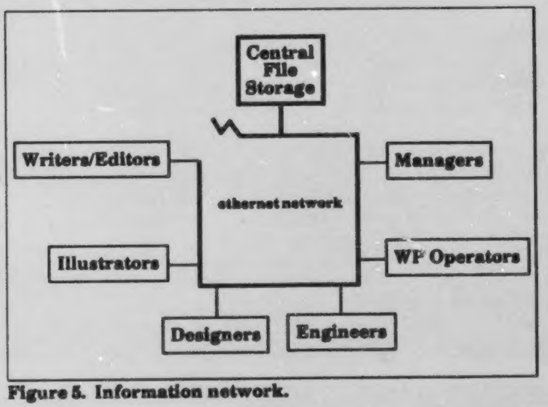

Central File Storage
Writers/Editors
Managers
ethernet network
Illustrators
WP Operators
Designers
Engineers

Figure 5. Information network.

Advances in Word Processing Equipment

Shirley G. Carter, Moderator

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Adjusting to advance technology presents new challenges to today's technical communicators. The most difficult obstacle to achieving the benefits promised by technology is adjusting to the wave of change.

As technical communicators we must be knowledgeable of the office automation concept. The idea of interfacing word processing devices with typesetting systems has been around for quite awhile.

The phrase technology for the technical communicator encompasses everything from managing the technical communicator to managing and controlling the publishing process.

Technology exists to implement almost any innovation technical communicators can conceive to improve and expedite the publishing cycle. For example, augment and improve the quality of camera-ready pages, provide consistency and standardization in the development and processing of technical publications, strengthen quality control, write and edit a word processor or personal computer interacting with a typesetter and store data to revise documents.

The objective of this session is to provide areas of changing technology which will impact the publication manager, writer, editor, illustrator, compositor and will have an impact on the publishing process.

Who should attend: Publishing managers, supervisors, writers, editors, and illustrators responsible for planning, reviewing, evaluating and designing technical publications.

How Word Processors Work: A Simple Word Processor in BASIC

Andrew Malcolm

Andrew Malcolm--associate professor of engineering and science English, with the National Technical Institute for the Deaf at the Rochester Institute of Tech., Rochester, NY, since 1972--spent 24 yrs. in industry, has an MS degree in printing and is an associate fellow of STC.

ABSTRACT: Faced with the dilemma of owning a just- released computer for which word-processing software was not then available, the author wrote his own simple word-processing program in BASIC. This program assigns the writers's keystrokes to 'string variables,' e.g., L$27 = "words." These strings are then accessible by number for reviewing, editing, and printing. Reviewing and printing are done with various PRINT statements. Editing may include replacing, deleting, moving and copying operator-selected lines by substituting one string variable for another. To justify copy before final printing, the length of each line (string) is subtracted from the chosen column width, e.g., [EXSPACE = WIDTH - LEN(L$27)], and the extra space inserted in the line between words. Spaces between words are identified by using the MID$ function in a loop and spaces are inserted using LEFT$ and RIGHT$ functions.

INTRODUCTION

In December 1982, I purchased an Epson HX-20 "Notebook" computer to free myself from the necessity of doing all of my work in my office. But because this computer was just introduced to the market, there were no word-processing programs available to use on it. After my initial use for mathematical calculations, I tried using it for writing memoranda by writing print statements in BASIC. This was, of course, unsatisfactory as I knew it would be. I had used several different word processors and was aware of the ease with which they captured keystrokes and formated text. Hearing no more about the planned word processors for the HX-20, I set about developing a word-processing program of my own.

I had learned to use BASIC for mathematical functions many years ago, but having had word processors and computer-assisted-instruction software available to me, I

had word processors and computer-assisted-instruction software available to me, I

had not found a reason to use the string manipulation capabilities of BASIC. String variables are variables which allow you to manipulate letters and words in quasi-mathematical ways. String variables are created by using a letter followed by a dollar sign, e.g. L$.

My first attempt to make a word processor resulted in a program which limited me to 78 lines by creating string variables from A$ to BZ$. From this beginning, I learned how to input text, edit copy and printout my resulting material. Soon, I was dissatisfied with this and attempted to improve my word processor by using numerical subscripts for my string variables. This not only allowed easy access to ranges of lines, but also made the program smaller and easier to use.

Finally, while talking to a student of mine (John Nakowski) about his work in my class, the subject turned to my "Notebook" computer. He was a computer engineering major in my technical writing class and was fascinated by the marvelous capacity of this tiny unit. I told him of my attempts at making a word processor and of my desire to justify my printouts. He did not know what justify' meant within the context of printing, but in a few minutes he was helping me create a justifying program. Later, this same student also helped me with software for using the internal microcassette recorder/reproducer contained within the HX-20.

The result of all of this was my learning some fundamental concepts of word-processing software. In this paper, I will share with you some of what I have learned. It is not the purpose of this paper to instruct the reader on how to write a word-processing program, but rather to give the reader some insight into the statements and commands which are used by word-processing programs to help technical communicators to better understand this important tool.

CREATING A DATA FILE

A variable, in computer parlance, is the same kind of thing as it is in mathematics, i.e., a letter or symbol of some kind which stands for a number, e.g., A = L x W contains three mathematical variables which may be assigned numerical values. The computer language, BASIC, and other computer languages allow you to create what are called string variables. String variables are variables which accept letters and words for their values and which may be manipulated in quasi-mathematical ways. As stated before, string variables are created in BASIC by placing a dollar sign after the letter(s) of a variable. Specific functions in BASIC vary somewhat between computers. String variables allow you to manipulate words in some of the same ways you can manipulate numbers in computer programs. I may write A$ = "WORD", B$ = "PROCESSING", and then perform the logical operation C$ = A$ + "#"+ B$. The printer's symbol for a blank space (#) is used hereinafter for clarity. If I then ask the computer to PRINT the data in C$, the computer will print the words, WORD PROCESSING. The "#" inserts the space between the two words.

To make a word processor which accepts input of words and assigns string variable names to them, I made the following program:

```
10 LET N = 1 TO 1000
20 LINE INPUT L$(N)
30 NEXT N
```

When the computer executes statement 10, it first makes N = 1. When statement 20 is executed, the computer asks for operator input. The words entered by the operator are assigned to the variable L$1. When the operator enters a carriage return, the program continues to statement 30. When statement 30 is encountered, the computer returns to statement 10, and sets N = 2. When statement 20 is encountered again, the computer again asks for input and the words keystroked by the operator are assigned to the variable L$2. This process continues until the operator enters text for variable L$1000. Thus, a file is created with sequential strings L$1 through L$1000 with each string containing the words entered by the operator. The length of strings is limited by the design of the computer. The maximum for the HX-20 is 255 characters. For those who have used INPUT for numerical variables and wonder why I have shown LINE INPUT, the answer is that LINE INPUT allows entry of most characters in the character set, while INPUT uses the comma and semicolon as computer commands.

To make it easier for the operator of this word processor, we add statements 15, 25 and 35 as follows:

```
10 FOR N = 1 TO 1000
15 PRINT "Enter text line "N".
        To exit, type @@."
20 LINE INPUT L$(N)
25 IF L$(N) = "@@" GOTO 35
30 NEXT N
35 CONTINUE
```

When the program encounters statement 15, it prints the words you see in quotation marks. The numerical variable N, which is outside the quotation marks, causes the computer to print the value of N which is the current line number. If the operator enters @@, statement 25 causes the computer to skip statement 30 and go to statement 35, thus breaking the FOR/NEXT loop of statements 10 and 30. I chose @@ because, to the best of my knowledge, <u>at</u> <u>at</u> never occurs in natural language.

MANIPULATING A DATA FILE

Now, to allow various functions to be used at the will of the operator, we replace statement 35 (CONTINUE) with a new statement which allows the operator to branch to various subprograms to perform the following functions:

1. Enter text (starting from statement 10)
2. Change a selected line
3. Amend from a selected line
4. Print a file with line numbers
5. Justify and review a file
6. Print a file on paper

Thus, our program is now changed to be:

```
10 FOR N = 1 TO 1000
15 PRINT "Enter text line "N".
        To exit, type @@."
20  LINE INPUT L$(N)
25  IF L$(N) = "@@" GOTO 35
27  IF C = 2 GOTO 200
30  NEXT N
35  PRINT "Enter command 1
    through 6."
40  C = INKEY
50  ON C GOTO 10, 200, 300, 400,
    500, 600
```

Statement 27 relates to the portion of the program for changing a single line, so it will be discussed later. Statement 35 provides simple instructions for the operator of the program. The operator simply types in a number between 1 and 6 to access the portion of the program which he desires. The INKEY statement accepts the operator's number, and the ON statement directs the execution of the program to the appropriate portion of the program. Thus, if the operator types 1, statements 40 and 50 direct execution of the program to statement 10 and the operator is returned to the original data entry statement at the beginning of the program. Entering 2 directs the execution of the program to statement 200, and so forth.

1. <u>Enter text</u>: If the operator chooses command 1 (text entry from line 10), the program first sets the value of C to 1. This assures that the program will not be made to exit at statement 27. The program then operates with the FOR/NEXT loop of statements 10 and 30 as previously described.

```
200 C = 2
210 PRINT "Enter number of
        line to be changed."
220 INPUT N
230 GOTO 10
```

2. <u>Change</u>: If the operator chooses to go to command 2 (Change a selected line), the program first sets the value of C to 2 and then prints instructions for the operator as shown on line 210. When the operator enters a line number for the

value of N, the program directs execution of the program to line 10. The program then functions as before, except that when it encounters statement 7, it returns to line 200 to await the next instruction, i.e., the next line the operator wishes to change. To exit, the operator again enters @@ as a data line and this returns the program to the statement 35.

```
300 C = 3
310 PRINT "Amend file from line
          number?"
320 INPUT N
330 GOTO 10
```

3. Amend: If the operator enters command 3 (Amend from a selected line), the program is directed to statement 300 and the value of C set to 3. This assures that the program will not be made to exit at statement 27 as is done with the line change command. Next, the operator inputs the number of the line from which he desires to amend the document, and the program is directed to statement 10 as before. The program now just continues in the FOR/NEXT loop as if the operator had never exited to the command statement. Thus, the operator can simply enter text from that line and continue until he chooses to exit (@@) or until the maximum line count (1000) has been reached.

```
400 C = 4
410 PRINT "To print your file with
          line numbers,"
420 PRINT "enter beginning and
          ending
line numbers."
430 INPUT U,M
440 FOR N = (U) TO (M)
450 PRINT L$(N),N
460 NEXT N
470 GOTO 35
```

4. Print with line numbers: If the operator enters command 4 (Print a file with line numbers), the program is directed to line 400 and the value of C set to 4. This, again assures that the program will not be caused to exit at line 27. Next, the operator enters the range of line numbers he wishes to have printed with line numbers. Statements 440 and 460 create a new FOR/NEXT loop with the values U and M. Statement 450 causes the computer to print the range of lines specified on the viewing screen by the operator. It also causes the printer to print the line number just beyond the end because of the trailing statement, N. The semicolon (;) is used to separate the two variables and print the line number in a column. If semicolon (;) were used, then the line number would be printed following the text in each line and thus would be ragged. Statement 470 returns the program execution to the command function, statement 35.

```
500 C = 5: I = 1
510 PRINT "Enter range of
lines to be justified."
520 INPUT U, M
530 FOR N = (U) TO (M)
540 EXSPACE = WIDTH - LEN(L$(N))
550 TEMP$ = L$(N)
560 IF MID$(L$(N),I,1) <> "#"
    GOTO 590
570 L$(N) = LEFT$(TEMP$,I) +
    "#"   + RIGHT$ (TEMP$. (LEN
     (TEMP$) - 1)
580 EXSPACE = EXPSPACE - 1
590 I = I + 1: NEXT N
```

5. Justify and review: If the operator enters command 5 (justify a file), the program is directed to line 500 and the value of C is set to 5. Again, since the value of C is not 2, this will not cause the program to exit at line 27. Next, the operator enters the range of line numbers to be justified. Statements 530 and 590 create a new FOR/NEXT loop with the values U and M. Next, statement 540 calculates the number of EXtraSPACEs needed to fill the line to the selected width. This is done by determining the length of the line using the function LEN(L$(N)) which has a numerical value equal to the number of characters in the string L$(N). This number is then subtracted from the chosen WIDTH and gives the number of blank spaces needed to make the line equal to the chosen width. Statement 550 causes the string variable TEMP$ to store a copy of the words in the current string variable L$(N). We will see how this is used later.

(5. Justify continued) Statement 560 uses the string function MID$. MID$ examines a selected string (e.g., L$(N)) by returning those characters within the string specified by the numerical values set off by commas just following the name of the string variable being examined. The numbers within the MID$ function specify the first character to be examined, and the number of characters to be examined, respectively, e.g. if L$99 = "The quick brown fox" then MID$(L$99,5,5) = "quick". Remember that blanks count just like letters and numbers in the string.

(5. Justify continued) In statement 560, the value of I begins with 1. (See line 500). As the program iterates through the FOR/NEXT loop (statements 530 and 590), it looks for single blanks because this IF statement is set equal to "#". Remember, the printer's symbol for a blank space (#) is used herein for clarity. The symbol <> means is not equal to. When a blank is not found, the execution is directed to statement 590 which increments (increases the value by one at each encounter) the value of I and returns program execution to the FOR/NEXT loop. When a blank is encountered, the program is directed to statement 570.

(5. Justify continued) Statement 570 is the logical string manipulation statement which adds blanks to each string as they are needed to justify a line. It is at this point that the string TEMP$ is used. The functions LEFT$ and RIGHT$ return that portion of a string on the left or right specified by the number within these string functions. As previously explained, the + "#" + inserts a blank in the lines between the left and right portions of the string, e.g., if TEMP$ = "The#quick#brown#fox" and I has incremented (increased by one at each encounter) to 4, then the contents of L$(N) will change to "The##quick#brown#fox". This process iterates through the FOR/NEXT loop until all of the needed blanks have been inserted into the line, and the total length of the line from first character to last is exactly equal to the value of WIDTH. Statement 580 is used to decrement (reduced by one at each encounter) the value of EXSPACE so as to count the number of blanks inserted in the line until EXSPACE = 0.

6. Printing: If the operator enters command 6, (print a file on paper) the program is directed to line 600 and the value of C is set to 6. Again, this avoids the program exiting at statement 27. Next the program encounters line 610 which print instructions for the operator. The operator then enters a range of line numbers for printing. Statement 640 creates another FOR/NEXT statement with the specified values of U and M. Statement 650 then causes the computer to print the specified lines of text on the line printer rather than on the screen. When all lines are printed, the program is directed to return to line 35, the command statement.

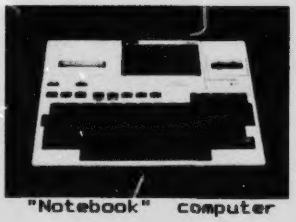
```
600 C = 6
610 PRINT "To print your file,
          enter beginning and"
          ending line numbers."
620 INPUT U,M
630 FOR N = (U) TO (M)
640 LPRINT L$(N)
650 NEXT N
660 GOTO 35
```

COMMENTS

The reader should understand that the program that has been shown here is impractical without a number of modifications. The program shown above has not provided for any operator error. The program as actually written by the author has many features which minimize the effects of operator error and add conveniences to the program. Such features have not been included here for the sake of simplicity and would not enhance the readers' understanding of word processing programs significantly.

CONCLUSIONS

This paper has explained only the main features of word processing. One characteristic of those functions included here is that they are quite complex. Complexity of functions requires time for execution. This paper should give the user of a word processor some appreciation of the enormous number of tasks that word processors perform for them. One of the clearest examples of this is the justifying program. The justifying program shown here actually must look at every character within an entire document to find the best place to insert blanks to justify the right edge of type. Consider what a program must perform to do global searches! It is the author's hope that this explanation has given the reader an appreciation of the enormous complexity of full-service word processors.



"Notebook" computer

What Can Writers Expect from an Electronic Publishing System?

Bernard L. Peuto, Ph.D

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ABSTRACT

ViewTech has created an electronic publishing system that automates document creation from start to finish. What this does for the entire publications process is analogous to what the word processor did to writing manuals by hand.

This new electronic tool not only dramatically increases productivity, it also improves the traditional roles of publications professionals. In particular, writers will experience the fundamental change of gaining vastly greater control of the entire document creation process.

NEW TRENDS CAST THE WRITER IN A NEW ROLE

Our society is quickly becoming "document dependent." Complex or high-tech products even now pervade every aspect of our lives. The "understood functionality" of simpler products is becoming less characteristic in general and is virtually absent in complex, highly technical products. Personal computer software is a good example of this. Without the manual, the program is worthless. It has no intrinsic value.

This trend makes the writer's role ever more important to companies producing complex products. More and more documentation is needed every day and that documentation is critical to marketplace success. And because the documents must reflect the product, they too are becoming increasingly complex. Greater document complexity necessarily casts the writer in important new roles. Not only does he become leader of the publications process, he also becomes a key player in the product development process.

Because it is the writer who has the detailed understanding of the product as well as the vision for that product's manual, he must light the path for those in the documentation process who don't. The trend is away from the production-oriented publications organizations of the past and toward a writer-oriented structure.

Another trend affecting the publications industry is the trend toward increased use of graphics and higher quality graphics (typeset text and inked illustrations pasted up into an attractive presentation) in all forms of commercial and technical literature. In competitive markets -- and most are -- better quality documentation offers a definite edge over the competition. With the prevalence of ever more complex products, documentation is frequently viewed as a marketing/sales tool. This results in increased pressure on the company's technical publications group to achieve higher graphic standards.

THE FUTURE HOLDS FAR MORE THAN ELECTRONICALLY AIDED PASTEUP

What is needed -- and possible -- today is far more than a production-oriented tool that automates back-end processes, but a system that automates the entire publications process while giving a writer direct control over each step early in the document creation process.

You're probably aware that new electronic tools to automate the publications process are beginning to make headlines. Unfortunately, however, these machines tend to be production-oriented tools focused mainly on electronically aided or "soft" pasteup.

We call the automating of a particular skill group (such as pasteup artists) "local automation" because it increases the productivty of only one part of the publications process. While these machines do, in fact, unburden the "back end" of the publications process from much of the mechanical drudgery of pasteup, they offer little advantage to the writer at the front end of the process.

ViewTech offers a far more dramatic increase in productivity and control to the writer/editor. The answer is to not only automate the skill groups locally, but to get them working together as a team on the same multi-user system.

Except for the ViewTech system, the current crop of electronic tools for documentation offers few benefits to writers. For example, some companies have upgraded their publications groups by installing page-composition workstations in their production departments. Why not move the benefits of this technology upstream to the writer/editor where they have the greatest impact?

Why restrict the writer's role by equipping him with a word processor that can only capture and re-arrange his keystrokes? Why not give him a machine that allows him to draw as well as type, and allows him to arrange his text and graphics on the page?

ViewTech has, in fact, done this. Our system gives the writer direct and instantaneous control -- electronically and on an automated basis -- over all the elements of the document he is creating.

HOW DID LOCAL AUTOMATION COME TO BE?

In the past, the tools used for illustration, typesetting and pasteup were manually oriented and extremely difficult to to use. Only trained people could use them. As the electronic counterparts of these tools emerged, their designers copied the existing model and produced specialized electronic systems that are also difficult to use. They did this because this made their design job easier. Their assumption was that a trained, dedicated operator would use them. This is true of all existing typesetting, computer-aided drafting and computerized pagination equipment.

ViewTech has taken a more enlightened approach. Although it had never been done before, our assumption before building the product was that advancements in technology should allow people who are unskilled in areas such as typography, illustration and pasteup to produce polished camera-ready art. The result is a user interface that is intuitive, simple and easy to learn.

WHY ARE SO MANY DIFFERENT SKILLS NEEDED?

The difficulty of the various tasks involved in creating a quality document, not to mention the complexities of the machinery designed to automate those tasks, requires many different and highly specialized skills. It is a rare person indeed who is conversant in the company's product and professionally competent in writing, illustration, typesetting, graphic design and pasteup.

The current answer to this problem is to find this variety of skills , then link them together serially: writers, editors, illustrators, typesetters and pasteup artists. The mix of skills and their order never varies. And the result is all too often a production-oriented environment.

The resulting process is really quite baroque. The writer writes a draft, which is then edited. It may or may not be keyboarded on a word processor by yet another person and then proofread. After editing and keyboarding of those changes, it is re-entered on a typesetting machine and tnen again proofread.

If the illustrations are to be high quality, they must be painstakingly drawn in ink. Although they may be drawn in parallel with the typesetting, it is only after all the text is typeset and the ink is dry on all the illustrations that the two can be merged together. Pasting up the printer's mechanical is difficult and laborious and produces a final document that may be gorgeous, but exceedingly difficult to change. But, inevitably, the reviewers demand changes, each of which causes the document to make another pass through this exceedingly cumbersome process.

Thus, the writer is necessarily dependent on a group that has little technical understanding of the product being documented. He must spend countless hours describing to them how he envisions the drawings and the layout, hoping for success after many iterations.

THE CURRENT PROCESS IS THE PROBLEM

This type of serialized work-flow process makes more work and degrades accuracy. It also makes the changes and revisions unnecessarily difficult and expensive.

This process makes more work because it encourages labor-intensiveness, because multiple passes through the process are required before the document is complete and because the writer must explain his ideas and concepts to many others.

A serialized process degrades accuracy. This is particularly true in the case of companies that make complex products (computers, instrumentation, etc.). The other skill groups involved with the production of the document do not have a detailed understanding of the product.

Because they do not really understand what they are looking at, the typesetter, illustrator and pasteup artist tend to introduce errors at each hand-off. No matter how careful the people are, each introduces small errors, particularly with more complex subject matter. Although each person's error rate may be small, the cumulative total is often quite large.

The solution, in the present model, is proofreading. Everybody proofreads everybody else's work at every stage. This is an obvious waste of valuable talent and resources, not to mention the frustration it provokes.

Another problem endemic to the current "skill chain" model is its effect on changes and revisions. Each change must follow a route identical to the original manuscript: the writer, the editor, the illustrator, the typesetter, the pasteup artist. There is no mercy, even for a one-line change.

THE VIEWTECH SYSTEM

ViewTech recognizes these problems and

solves them. Our system automates document creation from start to finish. We offer you an electronic assembly line that creates professional-quality documents quickly and painlessly.

The system is both multi-user and "multi-functional," which means you can do any of the four primary publications processes -- writing, illustration, typesetting, and layout -- from any of the system workstations. Thus one person can create the entire document from manuscript to camera-ready art, or the job can be divided up the among various specialists.

First-time ViewTech users who are not familiar with the revolution going on in electronic publishing are invariably thrilled by their first experience with our system. Imagine this: As you type, the document appears on your screen in real time just like it will appear in final camera-ready form. This is referred to as "What You See Is What You Get" because the image on the screen looks just like a page from the final printed book.

Not only that, but even if you can't otherwise draw a straight line, the powerful graphics capabilities of the machine help you create professional-quality drawings. You can insert them anywhere in the text as you are writing. Or, if you prefer, insert only rough sketches and mail them to the illustrator for refinement.

As you enter text and graphics, the computer automatically composes each page according to parameters previously entered onto the system. Later, the writer or a compositor (if the group has such a person), may refine the way the computer arranged a particular page. No previous experience in typography, illustration or layout is necessary to produce professional-quality literature.

Even the rough drafts emerge from the draft printer (usually a laser printer) in typeset and pasted-up form with all tables and illustrations in their intended locations, fully paginated. And, needless to say, revisions can be done on a "while you wait" basis with another full-dress copy available in minutes. Final drafts are easily turned into camera-ready printer's mechanicals by printing them out on a phototypesetter while you are off doing something else.

If the text for documents is keyboarded on a word processor or personal computer (or exists as an old database), the telecommunications capabilities of the system allow the information to be sent to the ViewTech system. Once on the system, the text is converted to typeset form and the pages are automatically composed.

Other input devices can also be connected for "bulk" entry of data. An optical scanner, for example, will take an entire archival library of inked illustrations and digitize them into the ViewTech system. You can then combine them with the text without anybody ever drawing a single new line. The scanner also inputs photographs so an artist can add callouts, arrows and other refinements.

BENEFITS OF AUTOMATED DOCUMENT CREATION

Moving graphics and composition capabilities "upstream" to the writer's workstation is a tremendous aid to effectiveness. The writer can focus on writing the document. He is freed from the mechanical tasks of making the document a physical reality. He can better control the organization of the document as well.

This technique also changes document creation from the time consuming and laborious process of serial tasks to a much shorter, highly automated process. All the specialist's tasks, such as illustration, can be done not only far more quickly, but also concurrently. It greatly reduces the overall labor content and shortens the elapsed time to create the document. Time savings for an average technically-oriented manual are often 50%.

Speaking of costs, anyone who works on complex documents knows that revisions to camera-ready art can be as costly as creating the original document. However, revisions become a simple matter on the ViewTech system. The writer or editor can, directly from his workstation, alter the copy, art or the page arrangement, yet have a new set of camera-ready art in minutes. The old method would have taken hours or days.

In fact, you can throw away your blue pencil. When you see a problem with any aspect of the typography, an illustration or the page composition, you can fix it immediately on your screen. You'll see the results in real time. You don't have to mark it up for someone else and wait two days to get it back.

The time and cost savings is a tremendous boon to any publications organization. In many cases, the savings on revisions alone over a two-year period are sufficient to pay for the entire system. If you add in the other cost savings, the system can pay for itself in as little as one year.

Not only are revisions dramatically simpler to make, but fewer mistakes are made to begin with. Because the system eliminates or minimizes the hand-offs between the various people working on the document, far fewer errors creep in. For example, once a writer enters a callout on a drawing, it never needs to be rekeyboarded. Nor is there any chance that the artist can place it in the wrong location because it's already "anchored" in the right place.

Furthermore, the ViewTech system eliminates need for companies to store huge archives of slowly yellowing camera-ready art. Why bother when a new set of high-resolution mechanicals can easily be output by a phototypesetter for each new revision of the book? Or, for books where few copies are needed, a laser printer will be happy to make them for you at about the speed of a copy machine.

And, simply put, the machine is easy to use. The way users interface to the machine was explored extensively and designed so that little or no knowledge of typesetting, drawing or pasteup is required. "Style sheets" automatically insert whatever typesetting codes and parameters are needed. Simply press a button to call up a window that contains the list of options. Then move the "mouse" to quickly place the cursor on the label "Chapter Head" and the machine does everything required to typeset the headline as specified by the style sheet (e.g. 24 point Helvetica Bold, with 20 points of leading to the next line).

Text, figure captions and other typographic considerations are all handled similarly. However, should you be interested in controlling the typography yourself, just alter the properties found on the style sheet.

You can draw just as easily. The system offers standard palettes of geometric shapes, screw threads, architectural symbols, elecrical engineering symbols and many more. You select the elements you want from a pop-up window that displays the palette, then combine them into more complex shapes, add the call outs and position the completed diagram in the right place on the page.

The list of other features available on the system could go on for pages. We'll describe just a few.

Want a table of contents? Or a list of illustrations? Simply choose a menu item and the machine takes care of the task for you. Need your spelling checked? Let the computer do it for you.

Editors can insert annotations and queries that do not print out in final form. If a document is revised, the system can be instructed to automatically insert change bars next to the revised copy. The system will also perform a global search in both the text and illustrations. You can send and receive other information, including inter-office mail and review copies with electronic ease and without resorting to hard copies.

The system is an entire publications department in a box.

EFFECTS ON THE ROLE OF THE WRITER

Although the writer may concentrate primarily on writing the copy, he retains control over the other phases the document must go through. He may have totally ignored making any typographical refinements, drawn only rough sketches and let the machine roughly compose the pages. Yet these elements are still a close approximation of how he wants the final document to look. He has in effect established a tight framework on which the typesetter, illustrators and compositors add aesthetic refinements.

Consequently, the writer has retained greater control over the other document elements. The existence of this "road map" also reduces the amount of discussion with the others working on the production end, because the writer has planted the "seedling" of each element. He may even have provided quite a bit of polish himself. The results are therefore much more likely to reflect the writer's original vision of the document.

If the primary purpose of creating a document is to convey information, the writer's job should be the primary focus of the publications system. But, in the current framework, it is often not. The production process is so difficult that it is "the tail that wags the dog."

The ViewTech system returns the focus to authoring where it belongs.

Update: Military Student Attitudes towards Instructional Television

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The use of instructional television (ITV) is common in American classrooms today, but recent evidance supports the proposition that students are no more in favor of TV use in the classrooms now than they were in the 1950s. Students object to the lack of interaction with the teacher. In 1982, I examined 472 airmen at Lowry AFB in order to establish their attitudes towards ITV. The data in this paper indicates that military students are at best ambivalent in their attitudes towards ITV use.

One of the most commonly accepted foundations of current teaching methodologies is the equivalency of instructional television with a live teacher with respect to transferring facts as measured by teacher-designed tests. TV in the classroom has repeatedly been proven to be as effective as the live teacher in teaching facts to students and in limited cases, values. ITV does have drawbacks in certain courses requiring independent or critical thought, but overall there is no significant difference between having freshmen taught by television and having a teacher accomplish the same task as indicated by test performance.

The first classic study which showed this equivalence was the Penn State study of 1955 which showed the effectiveness of ITV was independent of these situational factors:

a. Size of class.
b. Opportunity to ask questions.
c. Distance from the TV set.
d. Availability of textbooks as long as both TV and direct classes have the same access to books.
e. Mass versus distributed classes.
f. Opportunity for discussion after viewing the TV show.

Chu, Schramm, Dubin, Hedley, and Stickell all refer to the proved effectiveness of televised instruction.[1] Chu and Schramm in 1967 reviewed 400 comparisons of the effectiveness of live teachers versus TV and found no significant difference in learning results.[2]

Yet recent events in the world of television application indicate that television has not turned out to be the teaching marvel it was supposed to be as reflected by student attitude towards its use.

For example, the recent demise of both "Sunrise Semester" and the television curriculumn of the Mid-America University due to lack of student enthusiasm are indications that the technological advances in learning that were promised by the advent of television have not taken place. Indeed, it appears that such advances as interactive television teaching and computer learning systems may soon replace the current use of instructional television. But replacement has always been the trend with almost every technological classroom innovation. The introduction of sound recorders, slide projectors, and film was hailed as the key to increasing learning while increasing enrollment. None of these technological advances has dono better than the live teacher and all have been more or less discarded when technology next advanced. Yet of all the advances, television was hailed as the one with the most possibilities. The largest drawback to ITV has not been in the area of performence, but in the attitude towards its use. While administrators have generally regarded ITV as as means of reducing costs while raising enrollments, faculty and students have consistently shown resistance towards the use of ITV. Faculty deplore the loss of the student-teacher relationship, while students wail at the implementation of one-way communication. The student objections tend to fall in these areas:

a. Interaction with the teacher.
b. The lack of immediate feedback.

Interaction with the teacher is defined as "getting to know the teacher," class discussion, and the personal quality identified with the "best" education. The lack of immediate feedback involves the opportunity to ask questions, and is the most significant factor in student resistance to the use of instructional television, in spite of the fact that whether or not students are allowed to ask questions may not influence test performance. However, students miss the opportunity to ask questions in an all TV class, and this may influence the overall student attitude towards the institution.

One central issue in the application of television in the classroom is the motivation factor. TV works best with motivated students who can take the material presented on TV and conduct additional research. However, a trade-off occurs, for college and graduate students do not feel that televised instruction is the best education. They apparently forget that they are paying for information, not entertainment.

In 1982, I examined 472 airmen at Lowry AFB, Colorado concerning their attitudes towards ITV in the classroom. This was the youngest group examined, with an average age of 18, 79.6% male and 78.8% Caucasian. The results selectively presented in this paper indicate that the student dislike towards ITV of the 1950s is still present today, in spite of the fact that virtually all students grow up having information transferred via television in the home environment.

Perhaps it is an indication that the military educational system is performing correctly when it places the emphasis on the classroom teacher rather than on classroom technology, for these young airmen consistently indicated that they preferred direct teaching over television, as reflected in Table 1.

TABLE 1 — Lowry AFB

Question and Response Option	N	%
I'd learn more from a course that was:		
TV	26	5.5
Direct	208	44.0
Mix	232	49.1
I'd receive a better grade from a course that was:		
TV	26	5.5
Direct	208	44.0
Mix	232	49.1
The quality of instruction I receive now is better via:		
TV	385	81.5
Direct	73	15.4
Why do you feel that Direct instruction is better than TV?		
I get to ask questions	217	45.9
I'm inspired more	21	4.4
Direct teaching is generally:		
Entertaining	296	62.7
Dull	164	34.7
Communicative	403	85.3
Hard to Follow	63	13.3
Friendly	395	83.6
Remote	70	14.8
Fun	315	66.7
Boring	142	30.0
TV instruction is:		
Dull	259	54.8
Lively	194	41.1
Efficient	298	63.1
Wasteful	155	32.8
Fun	202	42.7
Boring	240	50.8
In a direct class, how often do you ask questions?		
At least once a class	326	69.0
Once every other class	71	15.0
Once every third class	19	4.0
Less	52	11.0
I'd learn more from:		
TV lecture w/ blackboard	80	16.9
Direct lecture w/ blackboard	280	59.3
Direct lecture only	72	15.2
TV lecture	32	6.7

In spite of the fact that television is less favored by the students when compared to direct instruction, the young students clearly indicated a preference for some television in the classroom, as indicated in Table 2. The solution appears to be a balance arrived at by answering the question of how much television is the correct amount? Additionally, two factors are involved:

a. The age and education level of the students. (The younger and less educated the students, the more in favor of TV.)

b. Teacher training. (If the teacher has no idea why TV is being used, maybe it shouldn't be.)

TABLE 2 — Lowry AFB

Question and Response Option	N	%
Would you like to have part of your education by TV?		
Yes	313	66.3
No	148	31.3
Would you be interested in a course taught all by TV?		
Yes	127	26.9
No	334	70.7
I'd rather not be exposed to any educational TV in my school environment:		
Agree	95	20.1
Disagree	176	37.2
I like TV in the classroom:		
Agree	263	55.7
Disagree	176	37.2
I want more TV in the classroom:		
Agree	215	45.5
Disagree	176	37.2
I would take a course of my choice by TV if I could ask questions immediately:		
Agree	423	89.6
Disagree	42	8.8

The importance with which the students regarded their faculty was apparent, as indicated in Table 3.

TABLE 3 — Lowry AFB

Question and Response Option	N	%
Educational TV will reduce the number of faculty needed:		
Agree	191	40.4
Disagree	67	14.1
Don't Know	195	41.3
I like the fact that an instructor won't call on me in a TV class:		
Agree	161	34.1
Disagree	283	59.9
How do you rate your military teachers overall compared to civilian teachers?		
Far better	92	19.4
Somewhat better	165	34.9
The same as civilian	158	33.4
Somewhat worse	36	7.6
Much worse	4	.8
Which is more honest?		
No difference	199	42.1
TV	43	9.1
Teacher	224	47.4

It was also apparent that if the environment was changed, the students' attitudes towards instructional TV would alter, as is indicated in Table 4.

TABLE 4 -- Lowry AFB

Question and Response Option	N	%
I'd like to have more tapes available at the nearest library:		
Agree	345	73.4
Disagree	122	25.8
I'd like to have CCTV available in my dorm:		
Agree	336	71.1
Disagree	122	25.8

The following propositions are the result of this research:

1. Students at Lowry AFB are in favor of some TV in the classroom, but are not in favor of total TV teaching if it means the loss of the student-teacher relationship. Careful consideration should be given as whether or not to increase TV use.

2. Students' loyalty towards their teachers may have influenced the negative results when comparing Direct versus TV teaching. However, the general trend of rating Direct teaching more favorably than TV teaching was comparative with results obtained at other military units.

3. Factors considered important by the students have been proven to have no effect on learning outcomes. However, this is not being communicated to the students.

4. Unless teachers are trained and students motivated, any technological innovation in the classroom will not meet with overwhelming success.

REFERENCES

[1] Godwin C. Chu and Wilbur Schramm, Learning from Television: What Research Says (Stanford, CA: Stanford University, 1967). R. Dubin and R. Hedley, The Medium May be Related to the Message: College Instruction by Television (Eugene, OR: University of Oregon Press, 1969).

[2] Chu and Schramm.

Second Annual Meeting of the STC Professional Interest Committee for Information Systems

Stephanie L. Rosenbaum, Moderator

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The First Annual Meeting of the STC Users of Information-Handling Equipment (now the Professional Interest Committee for Information Systems) was held at the 1983 ITCC. During this meeting, the workshop panel decided to ask STC members interested in the user's group to fill out a questionnaire about the types of information-handling equipment they use. We gathered names of attendees interested in the group and prepared a master list of approximately 100 people.

The panel then designed an "STC Information Handling User's Questionnaire" and sent it to everyone on the list. A cover letter identified the two purposes of the questionnaire:

1. To produce a resource directory to encourage information exchange among the STC members who have identified themselves as users of information-handling equipment.

2. To supply information to the Manager of the Technology Applications Stem of future ITCCs on a) the subjects respondents would like to have covered in ITCC tutorials and workshops, and b) speakers qualified to present and lead such tutorials and workshops.

The questionnaire responses were then compiled into the first draft of a Directory of STC Users of Information-Handling Equipment. This Directory will help members of the group identify others who use the same types of equipment, facilitating an exchange of specific information about common problems and goals.

In addition, we are preparing indexes to the Directory by company name and by type of computer, word processing, and typesetting equipment. A second draft including these indexes should be complete about the time of the 31st ITCC.

At the Second Annual Meeting, we will pass out copies of the questionnaire to meeting attendees who were not included in the Directory. Other agenda items for the meeting include reviewing subjects suggested by questionnaire respondents for future ITCC tutorials and workshops. We will try to develop a priority list of such workshops, so that the first group can be planned and presented at the 32nd ITCC.

The panelists listed below will be present at the session to help direct the discussion and to answer what questions they can. Bring your own problems and solutions and participate! This meeting should be an opportunity for all STC members involved in Information Systems to share their concerns with other STC members who have similar interests.

Stephanie Lee Rosenbaum, Moderator
President
Tec-Ed Technical Publications and Graphics Services

Founder and principal of consulting firm in computer documentation and training. Twenty-five years experience in information systems, including mainframes, minicomputers, and microcomputer hardware and software.

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Director, Technical Services
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Previously STC Secretary
Manager, STC Subcommittee on Computer and Technology Applications
Member, Assn. of Information Systems Professionals

Shirley G. Carter
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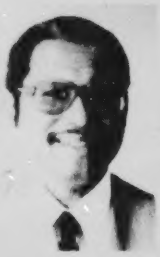
STC Assistant to President, Member Programs
Manager, Technology Applications Stem, 29th ITCC
Editor, Anthology No. 6, Word Processing and Automated Publications
Member, Federal Word Processing Council
Member, Assn. of Information Systems Professionals

Patricia Caenarvon-Smith
Associate Editor, Word Processing and Computerized Composition Dept.
Firman Technical Publications

Associate Editor, Word Processing, Technical Communications

Management and Professional Development Stem

William C. Davis, Stem Manager; Peter Vrouvas, Deputy Stem Manager



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As we advance further into the '80s, technology advances are changing the way many firms do business.

Nowhere is change more apparent than in the use of computers and the impact they have on companies that use them.

Nowhere will change be experienced more than in people relationships.

Managers and technical communicators must become more innovative, learn new ways of doing things, new trends, tools, and methods to reduce costs and make people more productive.

Those communicators who are able to sound the future, and use innovative techniques, will advance the communication of technical knowledge.

This year's stem includes several workshops, and a number of papers and panel discussions that will provide the novice and experienced manager and technical communicator with a wealth of information on hiring and appraising writers, audience feedback and analysis, and managing resources.

Listen to the various topics presented in the papers, and share your ideas in the workshops and panel discussions.

We feel confident that you will take back with you, a lot of new ideas that will improve your technical communication.

What, ME Do an ITCC Paper?

Linda Stout Chavarria and Morris Dean

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"More Online Documentation in the Future: Are You Ready?" *Proceedings, 30th ITCC.*

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"Make Your Reader the Hero of Your How-to Story" and "Two Characters and a Crowd in Search of an Author," *Proceedings, 30th ITCC.*

More than likely, you have valuable information for your professional colleagues at the 32nd ITCC in Houston. You probably have experience they do not, a better way to do something, a solution to a problem of theirs, or an insight into some puzzle of technical communication. Sharing your information is valuable not only for your colleagues, but also for you: to grow professionally and enhance your reputation. This paper takes you through the process of doing a paper for an ITCC: getting ideas, writing your draft, then planning and giving an interesting presentation.

OVERHEARD REMARKS

> Hey, I admit that I admire people who publish papers and give presentations at conferences, but I am just not interested in doing one. Sure, I enjoy reading their papers and listening to their presentations. And, I suppose it would be good for me in some way. . .
>
> . . .Well, I guess if I am really honest, I have to admit that I don't want to do a paper because I don't know how. I mean, how do those people come up with their ideas? Once they have their ideas, how do they ever get them so well developed and polished? Then, the really scary part, how do I get the nerve to do a presentation, much less do one really well?

We have both heard such remarks many times, from co-workers, local chapter members, and conferees at past ITCCs. What is interesting about them is that they never change. People have always had those unsure feelings and have held back their contributions because they did not know how to do a paper.

Over the past few years, between the two of us, we have attended six ITCCs and written and presented seven papers. Last year at the 30th ITCC in St. Louis, after hearing more remarks from discouraged people, we decided to try to help. We feel qualified to help, because we have had to overcome some misgivings, too!

WHY BOTHER?

Let's look at why doing a paper can be good for you. Maybe you haven't realized all the benefits yet.

Doing a paper is like climbing a mountain. It represents a professional achievement for you that enhances your reputation. People who know about it at work tend to take you more seriously as a professional. People who know about it outside work, even if they don't know what the STC is, show interest and respect for the accomplishment. Your manager is more likely to consider you a real professional; you have brought favorable notice to your company. In some companies, your attendance at an ITCC is assured if you do a paper.

Doing a paper is like taking vitamins. It tones your professional health. You sharpen your knowledge of a subject and your communication skills. You gain a sense of participating in the profession of technical communication as never before, because your ideas have helped advance the profession. Sharing your valuable ideas with friends and colleagues calls upon you to develop and crystallize your thoughts far more than if you do not share them. It enriches you and your profession to show your friends and colleagues by your example that they too can share ideas.

HOW CAN I GET A GOOD IDEA?

Getting a good idea, the right idea for you, can be one of the fun parts of doing a paper. The first thing is not to think that no one else would be interested, but rather to think that since it interests you, it may very well interest your colleagues.

Where Can I Get Ideas?

A good way to warm up your idea-generating motor is to look at previous ITCC *Proceedings* and issues of the STC's journal (*Technical Communication*). Not that you want to copy any idea, but these will tell you what has already been done so you won't repeat, will give you an idea of the interests of members of the Society, and may lead you to a topic that you want to take up where the last article left off.

Have you recently tried researching a topic you were interested in but been unable to find anything? If so, that is a perfect topic for you to write about. You are already interested in it and you have probably begun to draw your own conclusions by now.

Perhaps you are doing something innovative at work, or maybe you just developed a new approach to an old task. What about that recent triumph on the project you were working excitedly on? We in the STC would like to hear about those things. Chances are that some of us are contemplating the same task and wondering how in the world we can do it. (Be sure you check with your manager about making your innovation public.)

Keep your ears open at chapter meetings or at work for people talking about their work problems. If you have successfully solved them, why not share your solutions in a paper? Remember that the person with the problem can provide valuable insight into what your audience might want to learn from the paper.

This year's sessions can also inspire you. Which ones attract you the most? Which ones draw the biggest crowds? In St. Louis, large audiences showed up at sessions on developing easy-to-use manuals, online documentation, and the psychology of reading, among others.

You might enjoy doing a paper and presentation even more if you can get a friend involved. Find a co-author at this year's ITCC. Joining forces as co-authors increases your power: If you don't already have a paper topic, you can get together and brainstorm on it. Two heads bring a wider scope and more experience to a topic. And a co-presenter at the conference can be a comfort.

What Angle Can I Use?

Whatever idea you end up with deserves a catchy angle to make it more interesting to readers and listeners. If you are going to the trouble to present a paper, you want an audience for it. And, you want it to be good.

Your own outside interests may provide you with the angle that would make it interesting. Perhaps it is psychology, gardening, history, or personal computing. Whatever it is, enrich your paper and presentation on technical communication by applying your special knowledge and letting your interest in the field come through. Your aim is to share your ideas with your reader: to communicate. Have fun accomplishing that aim and your reader will have fun, too.

In searching for an angle, consider imitating writing that has delighted you; parody a famous play, write a Platonic dialogue. If you are an Art Buchwald devotee, you know he writes humorously about serious stuff, and you might like to try something similar at an ITCC.

Last year's readers seemed to enjoy Morris's paper, "Make Your Reader the Hero of Your How-to Story," which he wrote in the form of a correspondence between Uncle Moe and his niece Merryade (an anagram for "my reader").

If you have been reluctant to use scenarios or anecdotes in your regular work, think how you might use them as an angle for your paper. It takes practice to use these techniques well; the experience you get using them in an ITCC paper may be just what you need to enliven your technical writing.

Get lots of ideas, because the first one or two or three you think of will likely be ho-hum habitual associations. But the seventh or tenth idea may be an interesting innovation. Often, the exciting solution combines several ideas. (Morris was washing dishes when he thought of doing "Hero" as a short story in letters. He says that the excitement of combining the idea of using stories in technical writing with the idea of exemplifying the very technique in his ITCC paper made him drop a salad plate.)

Consciously choose a tone for your paper. How do you want to sound? How do you want to appear to regard your reader? (We have chosen to sound respectfully intimate, to regard our reader as willing to consider bold advice.)

Who is the reader that you want to reach with your paper? The ITCC is attended by people with a wide range of interests, education, and experience. Is your audience the student of technical communication, or the writer with years of experience who has attended many ITCCs? Whatever you decide, telegraph that information in the title and abstract of your paper.

HOW CAN I WRITE THE BEST DRAFT?

Really exploit that interesting angle of yours. If nowhere else in your technical writing, an ITCC is a place where you can be original. Your readers will appreciate it.

So, you have your idea. What next? Well, in preparing to write your draft, perhaps you want to interview experts. What about the people attending the Seattle conference? What a gold mine of information some of them are! Take advantage of their knowledge. They can also suggest other sources for you to seek out.

As well as interviewing some of these people, why not line them up to review your draft next year? To ensure time for reviews, start to write your outline *early*, like immediately after this ITCC. After you write your outline, set it aside for a week or two before you revise it.

Next, talk your idea through with a friend. Explain your outline. Note whether you use pictures to communicate; you may be able to use them as graphics. While still full of the excitement of talking about your idea, write the first draft. Ask some colleagues, including those you met in Seattle, to review the draft while it is still developing and you are relatively open to new ideas and criticisms.

Put the draft aside for a while to let it cool off. Then come back to it with detachment and revise it, considering comments from reviewers. If you are really trying to do something different, your reviewers may have more suggestions than if you did your paper the same old way. Use their suggestions, be flexible. Prepare yourself to modify, modify. Starting early will give you time for that.

Write your abstract and submit your paper. While the ITCC panel of judges are considering it, don't think about it; you need to get some distance from it. When you get your letter of acceptance, you will be ready to look at the draft with a critical eye. Cease for a moment being the paper's writer; become its reader. Revise it and use your professional friends once more as reviewers.

When you create the camera-ready copy, exercise the control the STC gives you over the final layout; make sure that the layout evidences the care you have taken with the content. Of course, follow the ITCC guidelines for final submission.

HOW CAN I PRESENT MY PAPER INTERESTINGLY?

Okay, the ITCC people have bought your paper and signed you up. You have something useful to say, and you have written it interestingly. Now, how can you *speak* it interestingly?

"Speak it *interestingly*?" someone asks, "I just want to be able to speak at all."

We understand that. We too mumbled into the podium once. But here is something that has helped us since: the attitude that we will have fun. If you actually enjoy yourself up there (up here) your listeners will enjoy you more too, and the more they do, the better *you* will feel about the whole thing.

What Can I Do Right Now?

To ensure that your presentation is fun, there are some things you can do, starting right now, even before you know what you are going to write about.

At *this* ITCC, look around you. Don't look just for content; also note how the better presenters give their talks. Use what you observe here as you plan your own presentation for next year. Watch the audience as well as the presenter. Do they seem to be enjoying the presentation, or do they look bored? Try to figure out why: Voice? Visuals? Tone? Pace? Facial expression? Apparent attitude? Maybe it is something about the presentation that you can imitate or avoid.

You might admire a presenter's variations in voice, creative visuals, enthusiasm, smile, confidence, or humor. But you would not want to copy someone's speaking in a monotone, using cliches, displaying ho-hum visuals, looking bored, or going too fast or too slow.

Some of the good things you see presenters do you can already do too, if you just think about it. Other things may take some training. But you have a year to prepare.

What Can I Do in the Months Ahead?

In the next few months, well in advance of the 32nd ITCC, take a class or attend a workshop on giving presentations. Try to find one that offers you a chance to be videotaped, so you can see yourself. Most people's experience with this is *very* positive. For example, many people discover that the fright they feel *is invisible* to the audience. Nor can their audience detect the "mistakes" they feel they are making. How liberating that is! People realize they don't have to worry about those things; they can direct their energy where it would be more useful.

We followed our own advice: Linda took a public speaking course and the Dale Carnegie course. Morris, in helping to facilitate a public speaking course, took the opportunity to be videotaped and receive critiques.

Don't turn down any opportunities to present between now and next May. And, if you don't get many speaking invitations, volunteer! Tell your manager you want to address the department. Offer to tell a local junior high school class about technical communication. From eighth-graders you can learn much about getting to the point and answering unanticipated questions. Experience makes perfect. And you might even get to like it.

A good book about giving speeches can't hurt either. One that we not only learned from, but also enjoyed for its humor, is Edward J. Hegarty's *Showmanship in Public Speaking*, published by McGraw-Hill.

One of the easiest things to do is the hardest: Start early. But, if you really do take notes on the style of presentations here in Seattle, and go back home and sign up for a course on giving presentations, and accept the first invitation to go speak at an elementary school, why, you will have started early!

When it comes to the design of your presentation, can you use the angle that you hit on for the paper? Or do you need a new one? For example, Morris considered enlisting another person to present "Hero" as a dramatic reading of the correspondence between Uncle Moe and Merryade, but he finally rejected that idea, because a reading seemed impersonal. He chose to speak directly to his audience in his own person. He devised a rowdy demonstration of tying his necktie to graphically represent the concept of making one's reader the hero by writing from the reader's point of view (over the necktie-tier's shoulder).

As you will notice at this conference, visuals can help a presentation a lot. Use them, period. All you have to do is decide what kind. "Visuals" doesn't mean just slides or charts. Use whatever would help you communicate your message and, equally important, get and hold the interest of your audience.

You could do a demonstration or have "actors" do one for you. You could tell a story in a series of still photographs, as Jim Mann did so well last year with "The Engineer/Writer Team Approach in Preparing a Technical Paper." You could use a fast-paced treasure of colorful, surprising, imaginative images, the way Bill Horton did to present "Toward the Four-Dimensional Page."

Mann and Horton had to start early to prepare those slide presentations. If you want to use slides, you have to plan and produce their contents, shoot the pictures, get them processed. . .

. . .And practice using them. How do you operate a slide projector or a transparency projector? Where do you stand so people can see the screen? These things aren't difficult in themselves, but when you are trying at the same time to say something interesting and useful, they can seem impossible.

Practice your presentation thoroughly, all parts of it. Practice getting up from your chair and going to the podium (or wherever you plan to begin). How are you going to use the microphone? Are you going to greet the audience or rush right in? Which hand are you going to use to press the button, or hold the pointer, or whatever?

Believe me, these little things can loom desperately large if you become aware of them for the first time when you are up here giving your presentation. Conquer them in advance, so you can devote all your attention to your topic and your audience, free from mechanical worries. Go through everything with friends, and encourage them to make as many constructive suggestions as they possibly can.

Realize that you don't *have* to be glued to the podium. Maybe you should move around, if it seems natural. You might plan to approach the first row or even walk among the audience at some point. But don't try anything like this unless it feels right. (Practice can develop that feeling.)

After I Arrive in Houston

As soon as you can after you arrive in Houston, talk with your moderator and fellow panelists about how the panel should proceed. One thing that can help *your* presentation is anything that helps your panel as a whole. Success rubs off. So, if necessary, take the initiative in modifying how the panel proceeds. Is the planned order of presentations logical, or should there be a switch? How will the moderator introduce you and make transitions from one to the next? If you want the audience to know something about you or your talk that you had rather not tell them yourself, have the moderator tell them.

If your moderator hasn't arranged for the panelists to practice together and help one another, see if you can do something about that. Your moderator or one of your fellow panelists may be even more apprehensive than you are. It can help you relax to help them and forget about yourself.

Check out the facilities ahead of time. They are for *the sake of your audience*, so that you can give them your best. Make sure that you are comfortable with the facilities. Don't take anyone's word for them. See the room yourself, the podium, the screen, the seating. Do whatever is necessary to get them the way you want them. And, if they are still not quite the way you want them when you arrive to present, change them further!

In the minutes before your session begins, go into the audience and meet some of the people. Introduce yourself. Make a few friends. Ask them why they are interested in the topic; use some of their quotes in your presentation. Even refer to the people by name; you will feel more at home (and most people will love being quoted).

The Moment Arrives

Because you have thoroughly prepared your topic and yourself, you will do well. But, still, you are excited as the moment draws near for you to begin. You may interpret that excitement as fear, and there may be a little of that, even though you know that everyone in your audience *wants* you to succeed.

The public speaking teacher that has inspired both of us the most, Gaylord Mance, asks in his classes: "Since there is no reason to fear your audience, then what is there to fear?" Remember that many in your audience have had the same feelings that you have; the people that have not felt that way have never tried it!

Linda once saw William Schutz, experienced speaker, author of *Joy*, begin a speech by saying, "You know, I'm scared." The effect of this confession was dramatic. Linda could feel the sympathetic energy come forth from the huge auditorium. Schutz went on to give an inspired speech on that occasion.

What your excitement really indicates is that you have the energy you will need to do well. You should worry if you are *not* excited! The trick is to use your energy and not let it use you. If you made some friends in the audience moments before, that will help you feel you are speaking to friends. If you know *exactly* what your first two or three sentences will be, and you have rehearsed and rehearsed them, and you begin by saying them clearly and strongly, that will help you relax.

Finally, remember that *you* are your most important visual. If you are having fun up there, the neatest thing in the world is to look like it. Your audience will tend to regard the subject the way you appear to regard it. They will also look at you the way you look at them. Let the twinkle in your eye and the smile on your beautiful face say to them, "I like you!" If you are friendly, honest, and excited about your subject, your audience will respond the same way. And you will experience an immediate benefit of presenting your ITCC paper: the pleasure of having an appreciative audience.

Structured Common Sense: An Uncommonly Sensible Structure

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ABSTRACT

The Editorial Division of the Lawrence Livermore National Laboratory's Technical Information Department has developed a management system for its editor/writers that is based on consistent attention to good leadership, a positive approach to performance appraisal, and a salary-management system that emphasizes fairness and objectivity.

The 50 or so technical editor/writers at Lawrence Livermore National Laboratory (LLNL), an establishment operated by the University of California under contract to the U.S. Department of Energy, work in an environment characterized by a tradition of academic freedom, by a wealth of possible assignments, and by the availability of computerized equipment that incorporates many of the latest trends in publishing. The editorial supervisors, besides being aware of this environment, must honor a multitude of federal, state, and university policies. They must also ensure that all editor/writers are assured of job satisfaction, fair performance appraisals, and appropriate salaries—while always remembering that the Editorial Division was established for and dedicated to the task of serving the Laboratory programs. These supervisors have worked hard to formulate a philosophically consistent, common-sense management structure: for this session, three of them have prepared papers through which they share the details of this structure.

First, Howard Lentzner describes his leadership philosophy. He believes that successful leadership of a group of technical editor/writers demands emphasis on maintaining good communication among members of the group, providing training opportunities, and promoting good morale.

Chuck McCaleb writes of the performance appraisal process, emphasizing its year-around character. He explains how, at LLNL, an appraisal is a joint venture involving not only the editor/writer and his immediate supervisor but also the authors and technical organizations with whom each editor/writer has worked. The procedure gives the supervisor and the editor/writer a chance to look ahead and leads to a higher degree of professionalism.

This management structure, which is based on consistent attention to good leadership and strengthened by a careful, positive approach to performance appraisals, culminates in a salary-management system that puts great emphasis on fairness and objectivity. Kent Cummings explains that this system is based upon merit as determined by peer ranking. The ranking criteria comprise nine performance areas. The criteria and the numerical values assigned to each area were developed by means of a careful process that included discussions and reviews by the division leader and the six group leaders, and a review and feedback loop that involved all the division's editor/writers.

On the following pages, our contributors share with us a management system that might serve as a model for similar organizations—a carefully developed and honed approach to managing technical editor/writers that combines a well thought-out structure with the application of a lot of common sense.

Performance Ranking of Technical Editors/Writers

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ABSTRACT

The salary management program we use in the Editorial division of the Technical Information Department at Lawrence Livermore National Laboratory is based on merit, with top performers receiving top salaries. Therefore, peer ranking is the heart of the program. Each group leader ranks his group members by measuring them against each other on ranking criteria that encompass nine broad performance areas. The division leader melds the group lists into one division-wide list, normalizes it, and separates it into peer groups. Division personnel like the ranking scheme, and it has proved an effective tool for compensation management.

INTRODUCTION

Compensation levels—salaries—of the members of the Editorial Division at the Lawrence Livermore National Laboratory are reviewed once a year, all at the same time. Salary raises are given after the salary review. Prior to salary review, technical editor/writers are value ranked relative to each other, and prior to ranking they are evaluated as to individual performance. These combined personnel actions take place during the six months from April through September.

WHY RANK?

The Lawrence Livermore National Laboratory is operated by the University of California for the U.S. Department of Energy and is subject to the policies of the University. It is University policy to compensate employees on the basis of merit: those making the most valuable contributions should receive the highest salaries. Peer ranking is a way to determine the relative values of the contributions made by members of an organization, and therefore peer ranking is crucial to our merit salary-management system.

Two factors make salary management difficult. First, the Laboratory is funded by the federal government and hence has a fixed budget. The number of dollars available for employee compensation is strictly controlled by the Department of Energy; the Laboratory does not have the option of skimming profits to reward unusual and outstanding contributions.

Second, everyone knows everyone else's salary. In 1975, California passed a freedom of information act that makes certain information on state employees part of the public record. Salaries are included in that information, and it is common practice for Laboratory employees to scan easily obtained computer printouts of staff salaries and compare their raises with those of their colleagues.

Because of these conditions, we in the Laboratory's Editorial Division work at objective salary management. Over the years, we have developed a salary-management algorithm that computes a technical editor/writer's annual raise based on the amount of dollars available to the entire pool of technical editor/writers and the individual's present salary and rank standing within the pool. We have defined also a list of ranking criteria. How we derived the list, what the specific criteria are, and how we actually do the ranking are the subjects of this paper.

HOW WE DERIVED OUR PRESENT SCHEME

The Editorial Division management—the division leader and the six group leaders—meets regularly twice a week, once for about two hours to discuss operations and once for one hour to refine management practices and set policy. In the latter meeting, we work from a list of projects compiled and ordered according to priority by the group. About a year-and-a-half ago, a project to revise our technical editor/writer ranking criteria was at the top of the list.

We had had ranking criteria in the division for several years, but they had not been entirely satisfactory. The feelings in the division were that they were too vague, too specific, too broad, too narrow, permitted too much subjectivity, etc. And so we set about revising them.

This revision became a major undertaking. Several months of discussion on management philosophy, psychology, and technical benchmarks ensued. Eventually, enough agreement was reached that we could ask one member to draft a strawman proposal. Within a few sessions, a final version was completed and approved by the group.

The next order of business was to circulate the proposed new ranking criteria for comment among the division's technical editor/writers, which we did, allowing three weeks for feedback. Most of the comments were favorable and suggested no changes in what was circulated. A few comments suggested minor clarifications, which we incorporated. One or two comments we rejected as inappropriate.

We drafted the final criteria and distributed a copy to each technical editor/writer.

THE RANKING CRITERIA

The ranking scheme is based on a point system. A group leader evaluating a technical editor/writer relative to the division's other editor/writers assigns points for each of nine criteria.

An appendix to this paper lists the ranking criteria—nine criteria grouped in three main divisions totaling 100 points. In addition to the specific criteria, the listing includes a philosophical statement about each criterion and a sampling of specific skills, traits, and areas of expertise a group leader may examine to evaluate a technical editor/writer on that criterion. We have attempted, in this way, to be as clear as possible—to our technical editor/writers and to each other in the management group—on what we are evaluating.

HOW THE SCHEME WORKS

We write performance appraisals in April and May, do peer ranking in June, and determine the annual salary actions in July and August. Raises go into effect on October 1, the beginning of the new fiscal year.

Each group leader evaluates every member of his or her group on each criterion. The individual being evaluated is assigned a number for each criterion indicating how closely that individual approaches a "perfect" criterion score. For example, a perfect score for the criterion "demonstrated language skills" is 20 points. If the individual being evaluated has demonstrated his or her language skills to be quite good during the year, the group leader may give, say, 16 points. All group members are evaluated on each criterion, relative to each other and to an agreed upon benchmark supplied by the division leader that indicates where a technical editor/writer with average performance will fall in each category.

Each group leader ranks not only the present members of his group but also any technical editor/writer who had been in his group for at least two months sometime during the year. There is a fair amount of personnel shifting during a year (because of changing program needs and personal assignment choices), and therefore there are always several technical editor/writers to function as reference points; that is, there are always several editor/writers who are evaluated by more than one group leader.

The group leaders give their evaluation sheets (Fig. 1) to the division leader who then normalizes the ratings and combines the lists. Even though the division leader has provided the benchmark for average performance in each category, the combined list still needs some leveling. Some group leaders may have one or more of their categories offset down or up; that is, they may have rated group members, on average, in one or more of the categories a point or two above or below the division-wide average. Some group leaders may have compressed or expanded the point range in one or more categories.

	Language skills	Publications knowledge	Use of human resources	Level of responsibility	Job difficulty	Service to TID	Response to deadlines	Quantity of work	Program knowledge	Total
Rupp	8	5	5	7	5	3	5	4	4	46
Hatcher	15	8	6	11	6	3	6	6	7	68
Jones	18	9	9	14	9	4	9	9	9	90
Moss	8	5	5	7	5	2	5	4	4	45
Trent	13	7	5	9	5	3	5	5	6	58
Cook	14	7	7	11	6	3	7	7	7	69

Figure 1. A group leader's evaluation sheet. Group members' names are on the left, and ranking criteria are at the top. Group members are evaluated relative to each other and to a benchmark (indicating an average score) on each criterion.

These discrepancies in the combined list are revealed by the presence of the reference personnel on the list. The division leader works with the group leaders to revise the evaluation lists until they fit with the combined list.

When the division leader is content with the ratings by the individual group leaders and the lists are combined, he sorts the individual technical writer/editors according to total point scores. Natural clusters, or peer groups, become obvious, as shown in Fig. 2. A typical division list will have the highest scorer at around 90 points and the lowest scorer at about 40 points. Generally, about five peer groups will fall out. (I have shown only four groups in the hypothetical case of Fig. 1 because this is a short list of 17 names; our actual division list would be about 50 names.)

Jones	90
Smith	89
Max	87
Sinclair	72
Cook	69
Ventura	69
Hatcher	68
Provine	67
Boer	59
Trent	58
Ozaki	58
Imhoff	56
Wilcox	55
Alves	48
Cooper	48
Rupp	46
Moss	45

Figure 2. Technical editor/writers listed in descending order of point score after the group leaders have evaluated them relative to each other and after the division leader has normalized the list. The dashed lines show the boundaries between the naturally occurring clusters, which become the peer groups.

The division leader presents the peer groups, without numbers and without any indication of how the individual editor/writers ranked relative to each other within a group, for discussion by the group leaders. The reason for omitting numbers and group rankings is that we recognize that our accuracy is only good within a few points, and it is valueless to spend time discussing the relative value ranks of those within the same peer group. One or two names may be moved from one peer group to another. A consensus is reached, the peer groups are set, the ranking completed.

Finally, the division leader evaluates the group leaders and fits them into the list of peer groups.

IMPACT ON DIVISION MEMBERS

The entire process of evaluating performance, value ranking, and reviewing salaries is time consuming. It's not easy, and it takes a lot of time. Is it worth it? Yes. It lets personnel know exactly where they stand, gives them a chance to discuss their perceived strengths and weaknesses, minimizes supervisor bias, and permits compensation management in as objective a manner as possible.

By and large, division personnel like the ranking scheme. They know exactly what they are being evaluated on, and they have specific areas to discuss with their supervisors when reviewing their rank standing.

Because individual judgment is necessary to value ranking, subjectivity is in evidence to some degree. Nevertheless, by clearly defining and publicizing ranking criteria and using a ranking system in which group leaders and division leader participate to reach a consensus, we have largely precluded the intrusion of subjective factors and personal bias.

APPENDIX
TID EDITORIAL DIVISION RANKING CRITERIA

(40) QUALITY OF WORK

Demonstrated language skills (20)

Language skills are the fundamental skills we bring to our profession. They are our unique contribution—the skills needed to formulate appropriate, accurate, and fluent communications in various media including presentations, multimedia, and poster sessions as well as written documents. While no one expects editors to be all things to all people, editors should know that to assume responsibility in any medium implies commitment to apply the highest quality of these skills in that medium.

In evaluating performance in this category, group leaders may consider the following:

(a) Produces work that is grammatically sound.
(b) Chooses language at the appropriate level that is free from cliches, malapropisms, unwanted jargon, or other snarls.
(c) Uses punctuation sensitively to give clarity, variety, and creativity to sentences.
(d) Avoids spelling mistakes.
(e) Is consistent in tense, number, voice, time, viewpoint, and the use of names and abbreviations.
(f) Puts the parts of a publication in the correct sequence, and properly orders main and subordinate ideas into a form the reader is led to expect.
(g) In expressing concepts, understands the ideas in question well enough to state them in words suitable to the chosen audience without losing what the author intended.
(h) Employs in oral presentations the same language skills demanded for written work with attention to visual, vocal, and body language cues suitable for oral discourse.
(i) Produces work that is characterized by smooth flow of arguments and reasoning processes without gaps or ambiguities, with appropriate balance between background and detail.

Demonstrated publications knowledge (10)

Publications knowledge is demonstrated by the skill with which editors get work published—work that may include reports, articles, brochures, manuals, presentations, poster sessions, Family Day support, and a program's own (draft or memo) documents. This skill is shown by the way the publications look, how much they ultimately cost, how quickly and easily they go through the system, and how well the editor helps manage the publication system in his program area.

In evaluating performance in this category, group leaders may consider the following:

(a) Knows and properly uses capabilities of other TID groups and of vendors.
(b) Matches job cost to intended purpose and audience.
(c) Consistent with work needs, knows and properly uses the capabilities of computers, text editors, word processors, and the like.
(d) Knows and is guided by TID (Laboratory) procedures and policies.
(e) Knows standard editing conventions.
(f) Keeps current in new publications technology and new ways of doing things.
(g) In preparing artwork, consistently avoids corrections and redrawing.
(h) Attends to program's publication management as appropriate.

Effective use of human resources (10)

This category reflects the importance of psychological and emotional factors in conducting editorial business. The required skills—eliciting cooperation, inspiring confidence, and working well on a team—are often keys to achieving a proper editorial response to Laboratory, program, and TID needs.

In evaluating performance in this category, group leaders may consider the following:

(a) Works in a manner that elicits cooperation from authors, reviewers, program management, and fellow TID workers in getting the job done.
(b) Works so as to inspire confidence, such as by convincing authors, reviewers, program management, and fellow TID workers that the editor knows what he or she is doing.
(c) Works well on a team as a leader or a follower, functioning well in, and taking responsibility for performing in, various roles as appropriate.

(30) JOB RESPONSIBILITY

Level of responsibility (15)

One important factor in this category is breadth of accountability. Group leaders are responsible for prompt and proper conduct of all business in their charge. Lead editors are likewise responsible for all business in their immediate charge. Generally speaking, broader accountability carries more weight than narrower accountability.

Another factor is scope of accountability—to the work, to TID, and to customers. Generally speaking, critical work for crucial customers, of far-ranging significance to the Laboratory, carries more weight than work of lesser consequence.

Beyond these, in evaluating individual performance, group leaders may consider such criteria as these:

(a) Volunteers to do jobs that look difficult.
(b) Accepts challenges in order to learn.
(c) Takes initiative in suggesting solutions to problems.
(d) Goes to lengths to train another in the detailed execution of a task.
(e) Takes on an unpleasant task because somebody has to do it.

General job difficulty (10)

Some assignments (or individual tasks) are tougher technically than others, requiring special editorial expertise or versatility. Some involve working with customers who are more demanding than others. Generally speaking, technically complex work for demanding customers carries more weight in this category than work of lesser complexity for less-demanding customers.

Beyond this, in evaluating individual performance, group leaders may consider such criteria as these:

(a) Edits effectively in a variety of disciplines.
(b) Handles new tasks that demonstrate initiative.
(c) Readily picks up new jargons and technologies required by the assignment.

Service to TID (5)

This category reflects a continuing TID commitment to professional growth and an awareness that our editorial success may depend on our abilities to adapt to changing needs and new communications technologies. In evaluating individual performance, group leaders may consider such criteria as these:

(a) Develops new business for TID.
(b) Brings back to TID some customer disaffected in the past.
(c) Wins award for publication excellence.
(d) Has paper accepted by a professional journal (e.g., STC).
(e) Serves on TID training committee or other professional committee.
(f) Teaches TID writing workshop or other professional course.
(g) Performs other valuable TID service, such as developing Wang glossaries.

(30) RESPONSIVENESS TO PROGRAM NEEDS

Response to deadlines (10)

Responsiveness to deadlines includes working closely with customers to set realistic deadlines and ensure that publications, presentations, etc., are ready when needed. Editors take responsibility for deadlines when they assume custody of the jobs in their care. In evaluating performance in this category, group leaders may consider such criteria as these:

(a) Regularly meets deadlines.

(b) Demonstrates ability to handle simultaneously many documents with deadlines.

(c) Gives jobs the best editing possible within time limits.

(d) Puts in extra time and effort when necessary.

Quantity of work (10)

Although the required volume of editorial work varies among programs, overall production by individual editors is an important indicator of performance. In evaluating performance, group leaders will consider the quantity of work produced by individuals during the reporting period.

Program knowledge (10)

Editorial performance in any assignment is enhanced by knowledge of program technologies and appreciation of program concerns and goals. Such awareness is merely advantageous in some assignments but crucial in others. In evaluating performance in this category, group leaders may consider such criteria as these:

(a) Understands program goals.

(b) Keeps up with program technology.

(c) Is aware of how TID functions affect the program.

(d) Protects program from unnecessary TID expense.

The Vulcanization of an Editorial Group Leader

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ABSTRACT

Leading a group of technical editors often reminds me of the summer I spent taking bales of synthetic rubber off Shell Chemical's conveyor belt. Facing my job these days is a lot like facing that line with its variations in speed and bale weight. Just as I wished for the bales to be less than 75 lb and to come as slowly as possible, I now wish for my group leading problems to be tractable. My wish comes true when the editors in the group solve most of their own editing problems, anticipate the problems that are coming, work fast, and work smart. My contribution is to encourage good communication, high morale, and appropriate training.

STYLE IN LEADERSHIP

I work in the Technical Information Department (TID) at the Lawrence Livermore National Laboratory. The Laboratory is a multiprogram, multidisciplinary laboratory that employs more than 7000 people. The four divisions of TID—Library, Production, Graphics, and Editorial—provide support to all the Laboratory's programs and projects. The Editorial Division, where I work, is divided into groups of about 10 editors, each with a group leader. Almost all the editors have programmatic responsibilities; that is, they are assigned to some project or program. Most have offices in these programs, and some spend almost all of their time in their programmatic offices. I have been group leader for two groups in the last five years. The first group served about 15 projects and was spread all over the Laboratory's 1-square-mile site. The group I now lead serves two programs and is in just two places. Some of what I have to say applies more to the spread-out group than to the centralized group, but I think the principles hold for both groups.

About 2 years ago, our division leader asked his group leaders to describe their leadership styles to their fellow group leaders. This talk grew out of that assignment. At the time, I hadn't really thought much about style. In fact, I wasn't even sure I had any style. But I could remember that when I first became a group leader I was less surprised and more at ease than I thought I would be. It all seemed vaguely familiar, although I had never supervised a group of editors before. The reason for this feeling of familiarity came to me one afternoon when I surveyed a line of folks outside my office and a pile of telephone messages on my desk. A vision of rubber bales on the floor flashed through my mind. It was all just like the summer I spent working on the synthetic rubber line.

SYNTHETIC RUBBER: A UNIVERSAL MODEL?

The synthetic rubber line worked something like this. Rubber was polymerized in big reactors and then worked up into crumb. The crumb was pressed into bales in three huge processing units. The bales came down a long conveyor belt where humans picked them up, wrapped them in plastic or bagged them, and put them into giant flotainers. The three processing units fed the belt, and they could all be going full tilt at the same time. They could also be set to press a variety of weights of bale. Working on the belt became very unpleasant for the humans if all three lines were going and pressing 95-lb bales. If my crew wasn't up to the challenge, we couldn't get the bales off the belt fast enough. The line would jam up, bales would start flipping into the air and onto the floor, an alarm siren would scream, and the foreman would rush out onto the floor waving his arms wildly.

Well, what does this have to do with leading a group of editors? For the sake of argument, let's consider the Laboratory to be a giant producer of bales, or publications, and the bales to be projects for my editorial group. Our job is to take the bales off the belt, package them, and ship them. Sometimes the projects are weighty, and sometimes they come fast. Regardless, it's our job to take care of them. If things jam up and the bales end up on the floor, we have failed at our job. To keep our operation going, editors in the group must solve their own problems, anticipate problems, work fast, and work smart. I can help by encouraging a high level of communication in the group, by arranging for the necessary training, and by trying to keep morale up. Some of the things I can do are to have good group meetings, visit the editors where they work, read the reports they have edited, find challenging work for them, and see that there is a social side to the work environment.

GOOD COMMUNICATION

Good editor-to-editor communication is probably our single most important means of keeping our rubber bales off the floor. On the Shell rubber line, good communication mostly meant the exchange between fellow workers of working tips that made the job easier. There were tips on the best place to stack the bags and how to hold them so the steam ram would not turn a perfectly good hand and bag into a mushy paper wad. Good editor-to-editor communication is just as important in our business. However, when the editors are spread out, this kind of communication needs active encouragement. I try to provide this in several ways. I try to keep abreast of what everyone is doing and what they know. That way, I can get the right people together when there is a potential problem. Over the long haul, the editors will be able to make these connections themselves if I do a good job of spreading the right information around. I have found that our editors have unique sets of interests and skills. They have backgrounds and interests in such things as linguistics, typesetting, and mathematical notation, which can be profitably shared among the group.

Good group meetings foster good communication. There have been times when I have not had as many group meetings as I should have had, the usual result being a rubber bale flipping into the air. One meeting a month is the bare minimum. I also think it is good to have some meetings in which each group member takes 5 minutes to talk about his own work, clever ideas, insoluble problems, etc. Sometimes we invite guests to talk. These guests are usually other people in TID, often editors from other groups or colleagues from the Production and Graphics divisions.

My behavior influences the quality of these meetings. It's hard, but I try to keep a balance between being quiet and encouraging discussion. Usually it is not hard to get editors talking, so my big problem is keeping quiet. I also miss a meeting occasionally, to let someone else have a chance to run the meeting and to give people a chance to talk about things they might not talk about if I were there. When I do talk, I talk about things like raises, ranking, and job classification descriptions. I put in a lot of effort preparing for these talks because I want to make a good impression in front of a bunch of professional critics, and I want to be absolutely clear and correct. One of the most successful presentations I gave to my first group was a description of what I do as group leader. They asked for it, because most of the group had no idea what I did. I had the mistaken notion that they were not really interested in the details of my job. This opened my eyes to an area of communication I had been neglecting. I had kept good track of what the group members were doing without ever realizing it was important for them to know what I was doing.

An element of good supervisor-editor communication is visiting: the supervisor visits the editor at the editor's place of work. This is a pretty popular notion now. The editors sometimes behave differently on their own turf, and it's possible to get a much better sense of what they're doing and the problems they're facing. I take any excuse to go visit. I used to deliver the Group Leaders Notes once a week. Now I deliver paychecks, copies of interesting articles, memos, and even photos or art from the main shop.

HIGH MORALE

For the people in my group, high morale seems to come with a sense of accomplishment. That's one of the reasons we try to associate editors with the Laboratory's programs and projects. In some programs, our editors feel as much a part of the project team as the engineers, physicists, and programmers. They get to share in the excitement of the project and the sense of accomplishment when it succeeds. I have also worked in a centralized editorial group with a minimum amount of contact with programs, and I firmly believe that more program contact makes for the highest morale. Having the editors farmed out to the programs does add a problem or two to my inventory, but on the balance I'd rather have these problems than poor morale.

A practical way I can boost morale is to read every report that comes out of the group. I usually give back marked-up copies as proof of my work. The comments are resented sometimes. I don't always know the circumstances under which the work was done, and sometimes I'm wrong in my criticism. This is hard work, and it is sometimes difficult to find the time to do it, but I think it's absolutely essential to keep proving to the people who do the work that someone cares about the product and its quality.

STIMULATING WORK

Stimulating work contributes to good morale. I have never refused an editorial job because it was strange. Some of the messes I've got editors into have been monumental. One of them, which was writing a user's manual for some sophisticated test equipment, is still only half completed after about 3 years of on-and-off work. However, with all this, only a couple of people have fled the group. For the others, it's kept things interesting. This willingness to expand the scope of our work has led us into oral presentations, more writing and less editing, all kinds of strange reports, and even ghost writing.

TRAINING

Our division recognizes the need for each of its members to participate in a training program to encourage professional development and to improve the performance of the individual and the organization. We encourage cross training within TID, in-house courses, outside courses, and attendance at conferences. Group leaders are responsible for providing information on training opportunities to their groups, and individual editors are responsible for initiating their own specific training plans. As in the rubber game, however, some of the best training is picked up on the job and from peers. I have already talked about this as part of editor-to-editor communication.

THE SOCIAL SIDE OF WORK

Four years ago, it was a revelation to me that work had a social side. I should have remembered that the rubber-line workers always stopped off for a beer after work, even if it was the graveyard shift and only 8:00 a.m. I'm no sociologist, but my observations lead me to believe that many workers have their major social interaction at work. They make friends at work, do their serious talking at work, and satisfy their need for fellowship and community at work. If work is lonely, then morale can be poor. I am not naturally inclined toward being a social organizer, and I have to keep reminding myself that it is something that needs attention. Something as simple as getting together for pizza and beer at lunch time works wonders. When we don't do these things, bales end up on the floor.

MOTIVATION

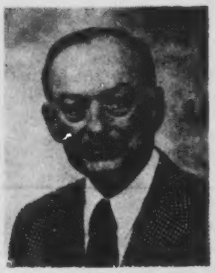
One of the topics I was asked to cover in this talk was motivation. If motivation means getting people to do things the way I want them done, I do not think I can do it. I don't believe that I can alter my group members' work habits or personalities, no matter how many management or psychology classes I take. The best thing I can do is find them work that suits their personalities and makes use of skills and work habits they have. At our Laboratory, we're lucky because there are a lot of things someone called a Technical Editor/Writer can do. Of course it's not always possible to find exactly the right job, but it is possible a lot more often than we think. So far I've found editors who like to write, editors who want to edit oral presentations, editors who really like to coordinate production, and editors who like computers. The big challenge is to get them in the right places, not to try to get them to perform well at jobs they don't like.

SUMMARY

I started with the rubber-line analogy, so I'd like to finish with it. The most important thing that I learned from the rubber line was that once things got out of control it was damnedly hard to get them back under control. The same thing holds true for a group whose rubber bales are technical publications. If I don't want our rubber bales flying through the air, I have to foster good communication among the members of the group, promote training, and keep morale high.

Positive, Participatory Performance Appraisals

Charles S. McCaleb



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ABSTRACT

Editorial performance appraisals at the Lawrence Livermore National Laboratory are joint ventures involving our technical writer/editors, who share in setting performance criteria and write summaries of their annual activities to guide their supervisors in preparing appraisal documents. The emphasis is on work-related accomplishments and contributions in the context of personal goals. Steps in the appraisal process include (1) information gathering, (2) discussion, (3) draft preparation by supervisor, (4) writer/editor review, (5) management approval, and (6) final sign-off. Performance information is sought from authors and technical organizations. Concerns are openly discussed between the supervisor and the writer/editor. Specific words and phrases in the appraisal document often emerge from these discussions, which constitute a positive, ongoing process that promotes communication and fosters mutual trust. The process is time-consuming but rewarding in encouraging strong work relationships. Our writer/editors like it; so does Laboratory management.

INTRODUCTION

Several months ago, over coffee, I asked one of our senior technical writer/editors how he rated our annual editorial performance appraisal system at the Lawrence Livermore National Laboratory. "Your frank opinion," I urged.

He pondered the matter. "Not perfect," he finally said, "but the best I've seen."

I took that as high praise, considering that this editor is not only a veteran of several high-technology companies but also an individualist who invariably resists management "programs."

We discussed the needs of an appraisal system. At its core, we agreed, are fair play, equal treatment, and a genuine attempt to promote dialogue between employee and supervisor on work performance. That requires honesty by both parties, tempered by judgment and common sense. The content should be work-related and the tone positive: that is, one calls a spade a spade but not a dirty shovel. The appraisal should be participatory and rooted in fact. Performance should be measured against set criteria and evaluated not only by supervisors but also by clients (technical user organizations) in light of their needs. We agreed that on all counts the LLNL system rates high.

We also discussed the difficulties of faithfully reporting performance in words that satisfy both writer/editors and supervisors, yet communicate meaningfully to upper management. Here, too, the LLNL system fares well.

"So what's your gripe?" I asked the editor.

"Nothing tangible," he replied with a grin. "I like the dialogue. It's just that I don't like being appraised."

LABORATORY GUIDELINES

I appreciate his reluctance. This editor and I have in other work settings shared the indignity of being handed annual "grades" of 1–5 (unacceptable to excellent) by supervisors who asked no feedback and seemed oblivious to the facts or circumstances of our work. That is not the approach taken by management here at the Lawrence Livermore National Laboratory, a large research and development facility operated by the University of California for the U.S. Department of Energy.

Laboratory guidelines require written performance appraisals at least annually for full-time employees and periodically as needed to support such personnel actions as promotions, salary increases, demotions, and dismissals. A narrative form is preferred. There is no standard format, but each appraisal must state the employee's job responsibilities and say how well he or she performed. Also required are areas in which improvement is sought—with specific actions suggested to improve employee performance—and a summary of the employee's overall performance and achievements.

Everyone is cautioned not to expect a one-to-one correlation of performance appraisal and salary. Rather, the performance appraisal is but a step in the annual appraisal-ranking-salary management process described in Kent Cummings's paper elsewhere in these Proceedings.

While the written appraisal carries special significance in that it eventually becomes part of the employee's personnel record, the appraisal system is an ongoing process characterized by good supervisor-employee communications in an atmosphere of mutual trust. One crucial part of this process is clarifying expectations. Another is finding and correcting problems before they get out of hand. The best written appraisals should contain no unpleasant surprises for employees.

AN EXERCISE IN COMMON SENSE

Within the Editorial Division of LLNL's Technical Information Department, we have translated these guidelines into an exercise in common sense. We have found, for example, that most of our writer/editors are eager to discuss their year's efforts. They want their supervisors to know the types of work and the major jobs they have done. Reviewing all that one has achieved during the year usually builds morale and prompts better performance. We've gradually become convinced that performance motivation is the major goal of appraisals.

So our appraisals tend to be forward-looking, relating the employee's strengths and weaknesses to personal goals and near-term assignments. Critical evaluation is there, to be sure, but we try to couch it in terms more likely to encourage than to discourage. Opinions are so identified. We try to make honest appraisals based on representative, relevant, and adequate information. We don't dodge issues; neither do we raise insignificant problems just to have problems to discuss. We also write our appraisals early enough (April-May) for behavior modifications to be reflected in our peer rankings (June) and annual salary determinations (July-August).

Another characteristic is interaction. Our appraisals are joint ventures involving the writer/editors, who not only share in setting the criteria by which their performance is measured but also write summaries of their activities to guide supervisors in preparing the appraisal. At least three employee-supervisor meetings are included in our six-step appraisal process:

(1) *Information gathering.* Using a form modified from one used elsewhere at LLNL, the writer/editor summarizes his or her annual activities (see Fig. 1). The supervisor seeks performance information from authors and from those in technical organizations who are familiar with the employee's work. This input may be written or verbal. Prudence requires the supervisor to fully understand its basis. Ethics require permission to tell employees who said what.

1. State major responsibilities of your job or jobs during the reporting period. Briefly describe your accomplishments with respect to these responsibilities.
2. List types of routine work you performed during the reporting period.
3. Describe what you regard as your most important contributions to TID during the reporting period, including work done on your own initiative for the Laboratory at large, for other departments or divisions, and for the scientific or publications community. Cite honors or awards.
4. List training programs, workshops, or courses you taught or completed during the reporting period, giving course title and, as appropriate, academic level, credits earned, and certificates or degrees awarded.
5. List contributions to affirmative action or job safety at LLNL during the reporting period.
6. List your goals for the coming year—professional, technical, personal (e.g., work habits), etc.
7. List your long-range goals in terms of preferred job assignments, particular projects or programs, desired levels of responsibility, etc.

Fig. 1. Appraisal data solicited from our writer/editors. Each item is on a separate page. Some items may not apply to a given individual; it may be appropriate to leave that page blank. We usually allow our writer/editors 7 to 10 days to complete this annual reporting form.

(2) *Discussion.* Supervisors meet individually with group members to read and review their summaries of annual activities. This may be the proper time to discuss feedback from the authors and technical organizations, as well as information from the supervisor's files (memories, notes on critical performance incidents, personal commendations, and the like). Enough time is allowed for meaningful dialogue. Specific words and phrases in the appraisal often emerge from this discussion, which should set a positive tone to what follows.

(3) *Draft preparation by supervisor.* Having the annual summary in view helps supervisors to remember crucial achievements. We try to cover all the bases, using words that make our writer/editors feel good about what they are doing (see Figs. 2 and 3). Where there are significant gaps in knowledge or experience, we suggest specific skill developments or behavior modifications to fill the gaps (no more than two or three high-priority items per appraisal). We also include recommendations for future assignments and responsibilities where appropriate, which is usually the case.

PERFORMANCE APPRAISAL

Rosalynn Murray
Technical Writer/Editor III

Performance Period: 1 April 1982 through 31 March 1983
Supervisor: Chuck McCaleb

Appraisal prepared by Chuck McCaleb April 13, 1983

RESPONSIBILITIES AND ASSIGNMENTS
Lead program support editor, F Division
Lead program support editor, C Division

ACCOMPLISHMENTS
(Achievements culled from writer/editor's annual summary, supervisors' files, and feedback from the authors and technical organizations.)

AREAS TO CONCENTRATE ON
(Writer/editor's strengths and weaknesses related to goals and assignments.
Evaluation couched in terms more likely to encourage than to discourage.)

SUMMARY
Rosalynn's performance during this appraisal period has been excellent.
(Preceding two sections briefly summarized.)

ASSIGNMENT FOR COMING YEAR
Lead program support editor, C Division

Rosalynn has given input to this appraisal and discussed it with her supervisor. She has received a copy of the appraisal. She has been informed that she may add written comments to the appraisal.

Discussed on:	Signed:
______________	______________________
Date	Chuck McCaleb
______________	______________________
Date	Rosalynn Murray

Fig. 2. Format of our written two-page performance appraisal.

(4) *Writer/editor review.* Supervisors again meet individually with their group members after allowing them a couple of days to review the written appraisal. This meeting, too, is an unhurried give-and-take session in which employees are encouraged to respond. While salary matters are usually reviewed around raise time (October 1), this meeting offers a chance for the writer/editor to ask how written appraisals influence compensation, promotion, employee development, and other personnel actions.

(5) *Management approval.* The division manager reviews all performance appraisals to ensure that terms or measurements have been consistently applied and all LLNL guidelines met.

(6) *Final sign-off.* The final written appraisal is signed by both supervisor and writer/editor, confirming that they have reviewed and discussed it. All LLNL employees receive copies of their appraisals and have the right to add comments which also become part of the written record.

Current LLNL policy is to keep performance appraisals in the active files for five years, then send them to storage. A Laboratory-wide study in 1980 indicated that most employees prefer permanent or long-term retention of performance appraisals in their active files.

PERFORMANCE APPRAISAL

1. Glenn is a senior and valued resource. He works effectively on difficult problems; people eagerly seek his advice in many problem areas. His performance, especially on complex assignments, consistently exceeds job requirements and norms for his peers. His insight, experience, and abilities continue to cause me and others to consider Glenn one of the Division's most valued members.
2. Rosalynn performed ably this year as a lead editor, serving as a technical advisor to other editors and helping them to complete complex tasks. In these matters she demonstrated sensitivity, good communicative ability, and wide-ranging interest in TID success. Among her immediate goals is becoming more familiar with C Division activities, with the aim of widening our support to this Division. She's interested in achieving production efficiencies for the publications on which she works. **Rosalynn weathered a hard transition this year from F Division to C Division, made awkward in part by her reluctance to compromise what she considered a personal grievance. I think she gained much from the experience.**
3. Ben is a productive and reliable employee. Given specific assignments, he stays with them until completed satisfactorily. He's a welcome member of the group who contributes to Division goals and demonstrates good publications knowledge. **I would find difficulty, however, in expanding his areas of responsibility to more complex or demanding assignments. We have discussed various remedies, including his taking the three-day project management course and working closely with senior editors on complex, time-critical assignments.**

Fig. 3. Typical evaluation and performance statements. Boldfaced in these fictitious examples (but not in actual appraisals) are important problems solved (2) or en route to solution (3). Choosing the exact words for such statements is what takes the most time in writing appraisals.

A HARVEST OF REWARDS

How well does our appraisal system work?

Well, ten months ago, at appraisal time, my group members and I jointly set 11 major short-term goals, many of which depended on factors beyond our immediate control. Nine of these have been realized. Last year, two members were "iffy" about their careers. Today they're happier, more productive, and far more enthusiastic. Six of the eight writer/editors in my group have taken on new, broader duties and responsibilities. Morale is high. So is personal achievement. Much of our work is classified, yet, even so, we won two awards in recent ITCC regional publications competition in San Diego.

We find positive response to be typical of those in the Editorial Division, even of my reluctant friend who doesn't like being appraised. In general, such a response is typical of the Laboratory as a whole. LLNL people consistently say they're content with the way their supervisors evaluate performance. We in the Editorial Division are not surprised, since we edited the LLNL appraisal guidelines and took the opportunity to make a few discreet suggestions here and there.

Our appraisal process is often hard and always time-consuming. Of the 100 or so workdays I spent last year directly on group activities, about a quarter went into performance appraisals. That's time beyond salary discussions, work analyses, and the ongoing, informal supervisor-employee communications that characterize a good appraisal system.

Is it worth it? Yes. We reap a harvest of rewards. Our system reduces bias and promotes strong work relationships. It enhances job performance. People naturally respond more positively to participatory, morale-building appraisals. Again, we don't skirt issues, because people need to know where they stand. We discuss the failures but always emphasize the accomplishments, talking about these first, last, and longest.

There's a collateral benefit. Through the appraisal process, supervisors develop closer working ties with group members, that is, gain a better understanding of their concerns and how they're doing on the job. Understanding often makes it possible to remedy a bad situation or improve a good one, which is one of the most mutually rewarding experiences in supervisor-employee relations.

User-Driven Information Development—The Key to Success

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Testing of a product's information can be looked on in one of two ways:

1. An after-the-fact assurance that we did what we set out to do in the first place, or
2. A key development activity that helps ensure that what we *are* doing is what we *should* be doing.

We information developers in IBM's Data Systems Division Laboratory in Kingston, New York, take the second view. This panel will describe our activities and experiences in making user needs and user tests a basis for developing information for products produced at our location.

Our session will consist of five papers describing activities we have undertaken and a running example showing how our experiences can be related and applied to a new product.

Why All the Fuss About a User-Driven Process?

It is *possible* to give very little thought to users and still produce documentation for them. *Possible* but not *profitable*. If a product's documentation does not meet the needs of the product's customers, the customers may find it difficult to use the product--even though the product itself may be very easy to use.

The Papers

A user-driven information development process must consider the user at each of its stages; writers and product developers must never lose sight of the product's ultimate users--the customers.

In "Test-Driven Information: A Seven-Stage Approach," Lowell Thing describes a seven-step approach for developing information in an environment that is driven by user testing.

In "User Testing as an Information Development Activity: Writing with Pen and Screwdriver," I describe a project in which the user testing of a product's documentation actually *preceded* the formal writing of that documentation.

In "An Information Developer's View of Usability Testing," Bernice Casey describes usability testing as an "outside-in" test in which the focus is not so much on the product as on the product's users.

In "Software and Documentation Usability Testing," Kim Shufelt describes how usability tests can be performed to give the greatest benefit to a developing product.

In "Trial by Jury: Collecting and Interpreting Feedback," Lee Ridgway describes how a formal evaluation of a product and its information can be done by testing task performance in a controlled setting and by surveying users to find out how satisfied they were.

The Running Example

During the session, we will define and design a hypothetical product and apply the principles of user-driven information development to the product's description. We hope that this example will help you understand how the principles described in the session's five papers can be applied to your own work as information developers and technical communicators.

If you want to meet the needs of your readers, you must first find out who they are and what they need. Listen to them! Note what they say!

User Testing as an Information Development Activity: Writing with Pen and Screwdriver

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Abstract

The information that we produce for our customers serves a purpose--to enable them to accomplish a specific task. We spend much of pre-writing time analyzing our intended audience and the work that they do, but it is a rare experience for us to find out how our books are received and used. It is even more rare for us to receive this information in time for us to actually use the information--that is, to change the information so that it can be used more easily and with better results. This paper describes a way that we used on a development project to obtain this type of information on timely schedules. Unique features of the project that aided use of this method are noted.

Orientations for Evaluating Our Writing

Abrams, in *The Mirror and the Lamp* (1), identifies four elements to be considered when judging a piece of art--the universe, the work itself, the artist, and the audience (see Figure 1). I will use his structure as a focus for describing ways that we can judge the quality of a piece of technical writing (which can be considered a work of art, even though many samples are done very "artfully"). Our evaluation of a piece of technical writing will vary greatly--in in form as well as rating--depending on which of these elements we consider most strongly.

If our consideration of a piece of technical writing centers on the universe, or the reality of the situation being described, we are concerned with how closely the piece describes reality. Criteria considered in this mode are primarily the accuracy and completeness of the information--that is, how well the writing "mirrors" the object or process being described.

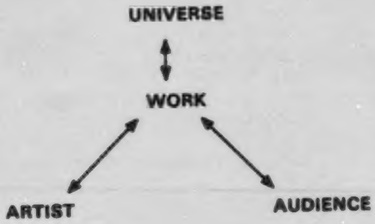

Figure 1. Orientation of Critical Theories

If our consideration of a piece of technical writing centers on the on the work itself, we are concerned with characteristics of the writing (style, mode, reading grade level, tone) and production (type style, size, and legibility; quality of paper and cover; and aesthetic design.

If our consideration of a piece of technical writing centers on the artist (the author), we may not find very much; technical writing is often impersonal, and the persona that shows through is often more a matter of an organization's style guidelines than an individual author's style. (2)

If, however, our consideration of a piece of technical writing centers on the audience (the user or reader), our hearts and minds are in the right place because this is the true focus of technical communication--to enable the reader to accomplish a task.

However, user orientation is often the most difficult aspect of the communication situation to factor into our writing. When we write, we have at hand all (or most of ... or many of) the facts we need. We usually have the writing and publishing specifications we need at the time we need them. But, for the most part, we don't have access to readers--our ultimate users--until after we have finished writing (and often publishing). This type of writing process is shown in Figure 2.

The writer uses available source material to produce first an outline and then a draft of the intended publication. This draft is reviewed--often by the same people who supplied the source material-- and is

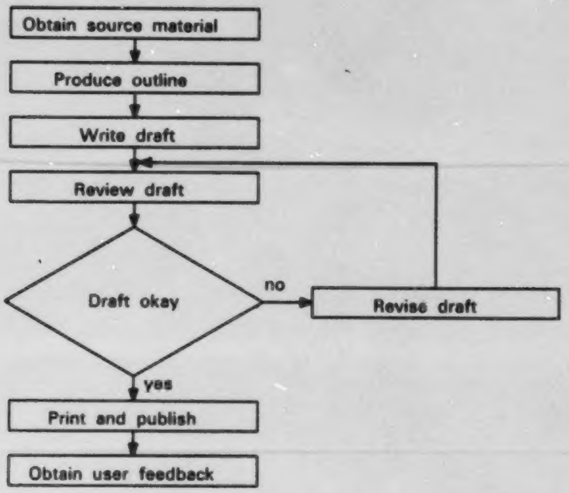

Figure 2. A Traditional Publication-Development Cycle

revised until it receives the reviewers' approval. The draft is the printed according to established publishing procedures.

Note that feedback from users is not received until *after* the book has been produced and distributed. Trying to build user orientation into a piece of technical writing at that point is like trying to build user orientation into a piece of hardware after it has been manufactured--impossible to do without major surgery.

Building User Orientation into Publications

The problem then is: how to build user orientation into the writing cycle from the very beginning. If actual users are not available to the writer (and usually they will not be), surrogate users can usually be found. And, with some luck and a lot of careful planning and screening, these surrogates can provide almost as much information about user orientation as actual users.

A major drawback to most methods of obtaining feedback is that they measure the effectiveness of information *after* it has been produced. A more effective way to build usability into our products is to build our users into our *development* cycle, not just into our testing cycle.

This approach is shown in Figure 3.

Using this method, the writer's first concerns are with the people who will use product and the tasks that they will perform when using the product. The given source material is analyzed to ensure that it is adequate to describe to users how to perform the tasks they will be doing. The next--and most critical--step is to perform the actual tasks that users will perform and note the information needed when *actually performing* the user tasks. From this analysis and experience a draft of the publication is produced. This draft is then given to surrogate users, who attempt to perform the users tasks. The draft is revised, as necessary, to ensure that it provides correct and adequate information. When the surrogate users can perform the tasks correctly using the draft, the draft is judged to be complete; it is then distributed for review. The review in this instance is really an assurance that the testing as been performed correctly and that all required changes have been incorporated. The draft is then printed according to established publishing procedures.

We had the opportunity to try this approach when we started to produce a document telling users how they could interconnect a set of IBM systems and terminals. (3) One out-of-the-ordinary aspect of this project was that we had available for our use the products and systems that we were describing; this is, of course, not always the case on a development project. We were given source material in the usual form--a design change request. The designer had done a better job than many designers do when it comes to documenting their work, but we were not comfortable with what we had. Was this really the information that our users would want or need? To find the answer to this question, we set out to determine the best way to supply users with the type of information they needed and, at the same time, to provide the writers with some sort of assurance that they had done their jobs well.

Many information development projects are driven by their input: the writers convert the given input to something that appears to be good output. We determined that this project would not be input driven; it would be *task driven*. (4)

The Task-Driven Approach

Members of the programming design and development, information development, usability, and assurance departments met to plan the strategy for documenting the system connections. (5) For each connection to be documented, we listed:

1. The tasks that users would perform
2. Who would perform each task
3. The information needed to perform those task
4. Where they would get the information
5. Criteria that we could use to determine when users had accomplished the tasks successfully

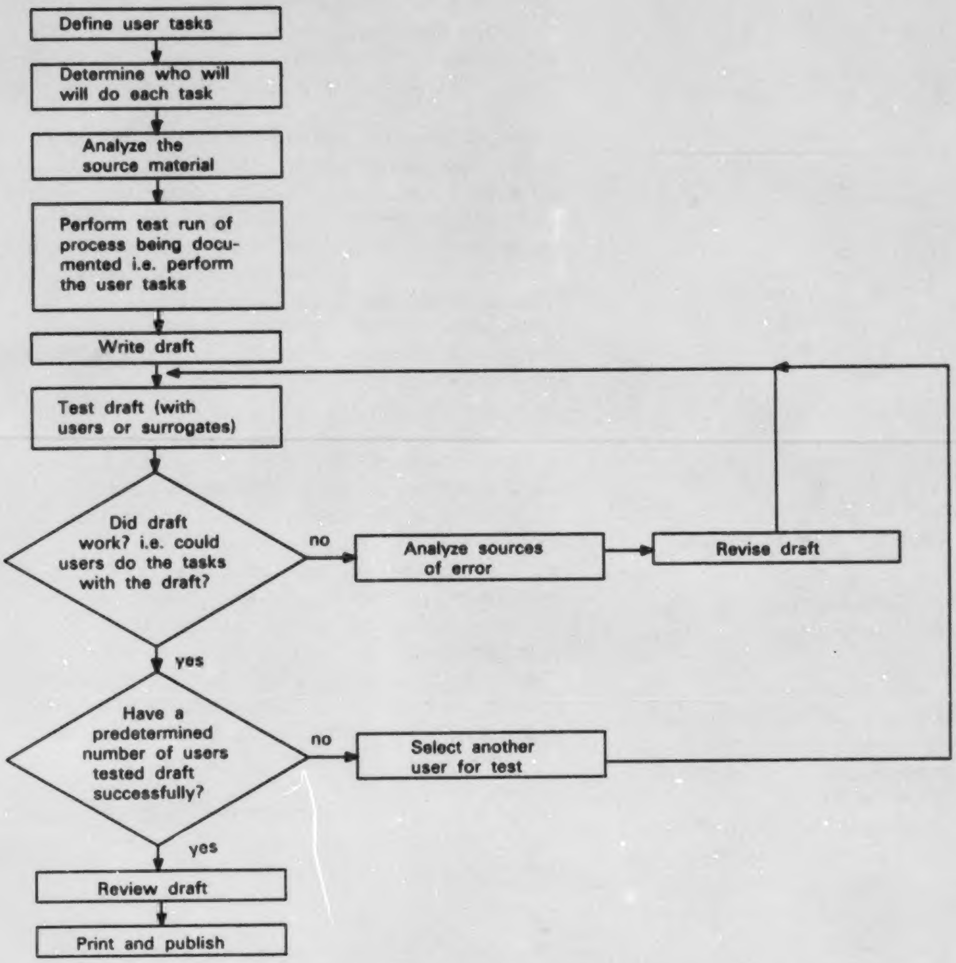
Define user tasks
Determine who will will do each task
Analyze the source material
Perform test run of process being documented i.e. perform the user tasks
Write draft
Test draft (with users or surrogates)
Did draft work? i.e. could users do the tasks with the draft?
no
Analyze sources of error
Revise draft
yes
Have a predetermined number of users tested draft successfully?
no
Select another user for test
yes
Review draft
Print and publish

Figure 3. A User/Task-Oriented Publication-Development Cycle

Once this list was completed, we looked at the input we had been given and found:

1. Not all the information needed was provided
2. Some of the information provided was not needed
3. Parts of the source material contradicted other parts of the source material
4. Some of the users' tasks were more complicated than they needed to be

To Build Usability into Publications, Build Users into the Information Development Cycle

We set out to produce publications drafts--not at our desks, but in the test laboratory. We used

- The set of task definitions we had produced
- The source material we were provided
- The collective knowledge of the programmers, writers, and testers assembled in the lab
- The actual programs and hardware that we were going to document

Using these resources we went through the steps in the connection process and documented our activities as we went along. In a very real sense, the drafts we produced were tested *before* they were written.

When we had produced a draft that we thought was complete and accurate, we brought in test subjects, selected for their similarity to our projected audience of real users. The test subjects tried to perform the connections using nothing but the drafts we provided. We made additions, corrections, and clarifications to the draft in spots when our subjects had trouble (either confusion or actually doing something wrong).

We repeated the test with a revised draft and a new test subject. This process was repeated until test subjects were able to perform the connections correctly within established time limits. Seeing the test subjects try to use our drafts and discussing their reactions after the test gave us a better idea of *what* corrections needed to be made and a better feeling for *why* they should be made than we could have gotten with a more conventional documentation procedure. (6)

Conclusion . . . Or Maybe a Beginning

As programming and engineering activities continue to move in the direction of distributed processing and personal computing, there are more and more opportunities for us to involve users--real and surrogate--in our information development activities. No longer need we be limited to using functional specifications for a product and audience definitions (which we know are inaccurate and out of date) as our only sources of information. We now have the chance to make information development a *development* activity--as it should be--rather than merely a *development support* activity.

Notes

1. Abrams, M., *The Mirror and the Lamp*, 1971, Oxford University Press, New York, page 6
2. For a discussion of persona in technical communication, see "The Persona in Microcomputer Documentation" by David Bradford in *1983 IEEE Professional Communication Society Conference Record: The Many Facets of Computer Communication.*
3. The manual produced was *IBM 8100 Information System DPPX Administration: Attachment Support*, SC23-0102.
4. For a description of the task analysis process, see "Need to Know: The Way to Go--A Task Analysis Primer for Technical Communicators," by Robert A. Ward in these proceedings.
5. For a detailed description of this task analysis phase, see "Need to Know: The Way to Go--Task Analysis: Contributions to Usability," by Candace Soderston in these proceedings.
6. For another example of the use of task analysis to produce customer documentation, see "Need to Know: The Way to Go--Case Study in Task Analysis," by Eleanor G. Wight in these proceedings.

An Information Developer's View of Usability Testing

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Abstract

It is important that information developers take part in testing the usability of software systems. During testing, we should evaluate the quality of the information that users must process as they use the system. Is the information presented in the best possible way? Does it help users or hinder them? This paper look at the types of information that should be tested, and examines our roles, as information developers, in the test process.

The Value of Usability Testing

As a software system is being developed, it undergoes extensive testing. The three most common forms of testing are:

> *Component or module testing*, in which programmers test the code to see if each component of the system is working correctly.
>
> *System or integration testing*, in which the entire system is tested for quality of performance, in keeping with its design objectives.
>
> *Usability testing*, in which test subjects, acting as end users, exercise the major functions of the system. The test results are weighed against the usability requirements that were established in the early stages of system development. The main question is this: Does the system meet the needs and expectations of the people who will be using it?

Usability testing differs from the other kinds of testing in its *focus*. It evaluates the system from the outside in, through the end user's eyes. Component and system testing evaluate the system from the inside out, through the programmer's eyes.

With this distinction in mind, we can think of software systems as consisting of two subsystems — the *user subsystem* and the *programming subsystem*. Figure 1 illustrates.

According to Holt and Stevenson (1), the user subsystem consists of many elements, including user training, the user/software interface, and documentation. The programming subsystem consists of program code and internal documentation such as requirements and design specifications.

In Figure 1, we see the interactions between the two subsystems. The focal point is the *user/software interface*. Through it, users give instructions to the software, and the software returns results such as error messages, prompts for additional information, and documentation. From the user's standpoint, then, the interface is the road leading into the software. From the programmer's standpoint, the interface is the road leading out; it drives the software components that do the actual work.

This analysis brings the role of the information developer into focus. We are more concerned with he *information components* of the user subsystem than we are with the software components; more concerned with usability testing than we are with other forms of testing.

What role should we play in the usability testing process? Our work should begin in the early stages of product development when there is time to design with usability in mind, as the next section explains.

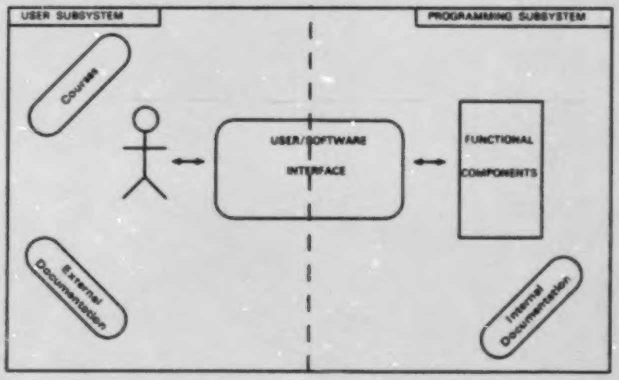


Figure 1. Software Subsystems

Designing Usability into a Product

The major information components of a software product are:

- Training materials such as online tutorials and user manuals
- Reference materials such as reference manuals and online help facilities
- Commands and, for interactive systems, interactive panels such as menus and online forms
- Error messages and status messages
- Program listings that are either printed or displayed online

All of these components have one thing in common: They establish a bridge of communication between the user and the software. If they communicate poorly, the users will consider them unusable. As communication specialists, then, we should play a prominent role in designing these components.

For general guidelines, we can turn to articles and books in the areas of software engineering and software documentation. For instance, the design of user/software interfaces has been covered quite well in articles by Wasserman (2) and Palme (3). Shneiderman's *Software Psychology* (4) gives a good overall treatment of the subject in two chapters, and the bibliography at the end of his book is quite extensive. In the area of user documentation, we can turn to recent articles on task-oriented documentation. (Refer, for instance, to the articles on task analysis in these *Proceedings*.) Finally, for an interesting look at how one help facility was designed, see Relles and Price (5).

The same guidelines that we use for designing user subsystems can then be applied to usability testing, as described in the next section.

Testing the Usability of a Product

As the product is nearing completion, usability testing begins. At that point, information developers should become part of a team whose goal is to determine whether or not the product is indeed usable. (For a discussion of the testing process and the role of the test team, see Kim Shufelt's article, "Software and Documentation Usability Testing" in these Proceedings.)

Specifically, information developers should assist in defining the test objectives; that is, in isolating those aspects of the user/software interface that should be tested. Let's look at some examples.

Testing the Usability of Online Tutorials

Some software systems are now using online tutorials as an alternative to printed documentation. In these tutorials, the computer explains the tasks that it can perform, and then takes the user through examples and perhaps some practice exercises. In this way, the user gets "hands-on experience" before having to use the system to do real work.

In testing the online tutorial, there are two usability aspects to consider: the computer as teacher and the user as student.

Is the computer a good teacher? Is there good response time and good error recovery? Can the student learn at his or her own pace? In general, the tutorial should be tested for its effect on the student. If the student becomes frustrated or confused during the learning period, the tutorial needs work.

The second question is this: Does the tutorial improve learning? This test involves two groups of novice users. The first group performs a task on the system after having used the tutorial. The second group performs the same task, but without having used the tutorial. The test results from the two groups can then be compared for:

- Average time it took to perform the task
- Number of successes and failures
- Attitude towards the product after the test

If the tutorial is a worthwhile learning tool, these tests should prove it.

Testing the Usability of User Manuals

These tests seek to determine the accuracy, completeness, and clarity of instructions in user's manuals. Given a task, does the publication help the user carry it out? At what success rate?

In software publications testing, tests generally fall into two categories:

- Planning the task
- Performing the task

First, does the publication help users understand the task ahead and help them prepare for doing it? In this case, there could be a test that poses a problem and asks the test subject to develop a plan (on paper) for solving it. For example, a major task for the administrator of an operating system might be to set up a plan for scheduling and handling print jobs at a site. The user's manual should contain practical advice for doing so.

Second, does the manual take the users step-by-step through each task? For instance, say that the task is to use a text processor to create and print a memo. Does the manual lead the user through the task from start to finish, or does the user get lost along the way?

Testing the Usability of Reference Materials

Reference materials such as reference manuals and online help facilities are often overlooked in usability testing. Yet, when people need quick answers to problems, they frequently turn to these tools.

Basically, there are two usability tests that these tools must pass. First, is the information in them readily accessible? If I need help with the syntax of a command, can I find the command easily in the reference manual? In the case of the online help facility, is it easy to get to, or do I need help in getting help?

Second, when I get to the right place, do I get the information that I need? Here, test subjects should be asked to find the answer to a specific problem in a reasonable amount of time. If they fail, it's really the reference material that has failed.

Testing the Usability of Commands

In this example, there is a command called **CRDATSET** that users issue when they want to create a data set. The command has three parameters: **NMDS** for naming the data set, **MAXRECLEN** for setting the maximum length of records in the data set, and **MAXNUMREC** for defining the maximum number of records that the data set can have.

For instance, a user might issue this command:

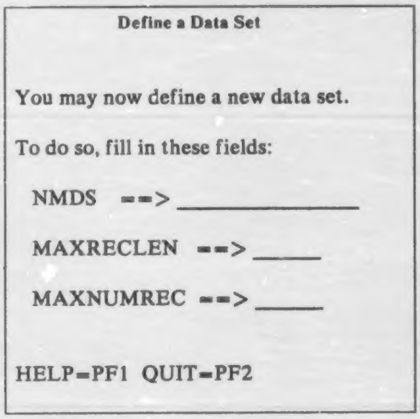
```
CRDATSET NMDS(anyname)
         MAXRECLEN(80) MAXNUMREC(300)
```

At the outset, you can safely assume that software users define data sets on a regular basis. Therefore, they don't want to look up the syntax of the command every time that they have to define one. We might design a test, then, to determine how much time it takes users to learn the syntax of the command.

It's likely that test subjects would have a hard time learning the syntax of the CRDATSET command. In other words, the command is not easy to use.

Testing the Usability of Interactive Panels

Now say that the data set definition process has been made interactive. The software helps the user supply the required data. Perhaps there is a fill-in-the-blanks panel like the one shown in Figure 2.



Define a Data Set

You may now define a new data set.

To do so, fill in these fields:

NMDS ==> ______________
MAXRECLEN ==> _____
MAXNUMREC ==> _____

HELP=PF1 QUIT=PF2

Figure 2. An Interactive Panel With Data Fields

The panel in Figure 2 is one step ahead of the CRDATSET command. Users don't have to remember the command name or the parameter keywords; they just have to remember what the keywords mean.

Some might say that it's the job of the help facility to explain what the parameters mean, but that's a fallacy. No user should ever be required to ask for help. The panel that is used to enter data should be as self-explanatory as possible. The data fields on the panel in Figure 2 could be, for example, "Data set name," "Length of records," and "Maximum number of records." Also, if space permits, the user should be advised of important limitations such as how long a data set name can be. The NMDS field in Figure 2 could then become:

Data set name________(1 to 8 characters)

Testing the Usability of Error Messages

There have to be tests that *cause* test subjects to make mistakes. The purpose of these tests is to determine whether or not the resulting error messages are useful. Do they:

- Explain the error to the user?
- Suggest ways of recovering from the error?

For instance, the following error message:

```
'MYOWNDATASET' IS NOT A VALID NAME
```

would cause confusion. What's wrong with the data set name?

This message is better:

```
The data set name is too long.
Choose a new name from 1 to 8 characters long.
For more details, see the NewSoft User's Guide
```

This message tell the user exactly what the problem is, offers a remedy, and refers the user to a user's manual, if further explanation is needed.

Bringing It All Together

In an ideal world, each component of the user subsystem would be tested separately because each serves a different need: some teach, some assist, some rescue us from bad situations. In the practical world, however, there is rarely time to test each component individually. Instead, we test them as elements of a single process or path. The user's manual prepares users for the road ahead, the commands or interactive panels get them going, the reference materials prod them along, and the error messages get them out of trouble.

In most usability tests, therefore, milestones along the path are evaluated for usability *only if the test subject encounters them*. But what if a test subject doesn't ask for help? What if the test subjects never make a particular mistake? Then we might never know if the built-in aids were usable or not, unless a future customer tells us so.

Still, the practicality of the world doesn't prevent us from designing information as if each word were going to be put to the test, as if we ourselves were the actual users. In the end, that's the true role of the information developer.

References

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3. Palme, J., "Interactive Software for Humans," *Management Datamatics*, Vol. 5, No. 4, 1976, 139-154.
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Trial by Jury: Collecting and Interpreting Feedback

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ABSTRACT

When a product and its information are complete and presumably final, formal evaluation can be done by testing task performance a controlled setting and by interviewing and surveying users to find out how satisfied they are with the way the product works (including the information). The results and the conclusions drawn from the results suggest requirements and objectives for changes or possible new products. Thus we close the loop from objectives through development through feedback to refined objectives.

INTRODUCTION

Feedback on a product really means how people feel about it. To understand and use feedback you must know what work people do with the product as well as how they feel about that work. Doing this requires a double process: seeing what people do, and asking how people feel. We see what they do by laboratory testing and by customer visits; we ask how they feel in visits and surveys.

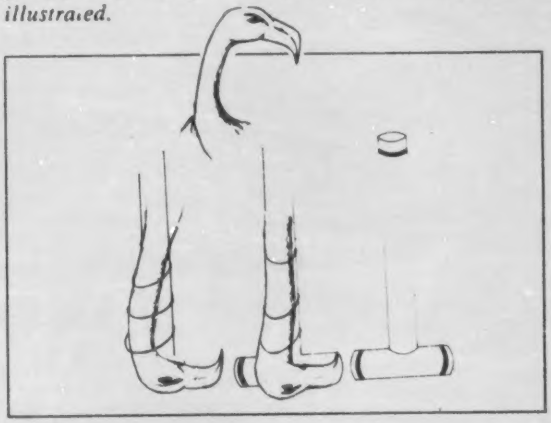
Although we would like to separate information evaluation from product evaluation, we have seen repeatedly that the users perceive a system that includes all the pieces of equipment and programming that they use, the information that they have available, and whatever other support exists (such as 800 numbers, support centers, or training classes). Their feedback relates to the system, so our evaluation must also consider the product, the environment (as far as possible), and the information.

Some user tasks (such as planning) rely only on information. For tasks such as finding information or using training materials much of the burden of success is on the information rather than on the product or system. But even in these tasks, there is a lot of interaction; the more information you need to have about a product, the harder it is to find a particular piece of information; the harder it is to use a particular device, the more complex the training material has to be. However, the focus of our evaluation is on information and on the interaction of product design and information.

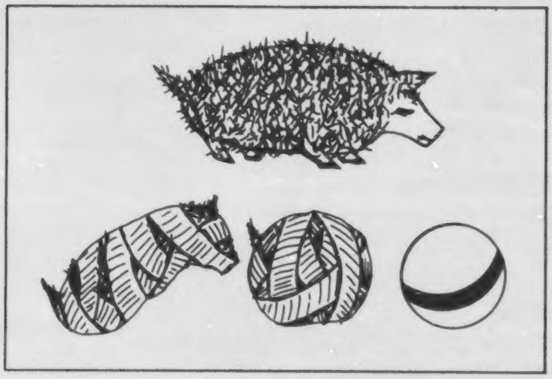
To illustrate some of the points that I am making, there are imaginary incidents from a hypothetical product development activity. Readers who do not enjoy nonsense or who do not have much time can skip the italicized examples.

The example is based on the croquet game from Alice in Wonderland, *and the follow-on improved croquet system. The components of the product (the croquet set) are the mallets, balls, hoops, stakes, and rule book. Other parts of the croquet system are the grounds, the referee, and the players.*

During development, we improved the physical devices, going from flamingos to croquet mallets in stages, as illustrated.



We also went from hedge hogs to wooden balls.



We wrote and reviewed the rule book, and we included a section of instructions on setting up and playing croquet.

EXPLORATORY LABORATORY TESTING

As a rule, we do laboratory testing during design and prototyping in order to find and fix problems. Bernice Casey's paper "An Information Developer's View of Usability Testing" describes this kind of testing. During development, the information and the product have been tested by people's using them to do particular tasks. The work that the user would do was broken down into specific activities that could be measured; the interactions among tasks, components, and environment were made as simple as possible, to isolate problems as much as possible.

We had someone plan a croquet lawn, marking where hoops would go, where lines would be marked, and so forth. Then they marked out a croquet area on the laboratory floor (reduced scale). People learned to use the mallets to hit the balls, following instructions in the back of the rule book.

Testing during development resulted in quick turn-around on changes, so that later parts of the tasks could also be tested. As problems were found, changes were made, and more testing was done. Each time a subject stumbled, an effort was made to find and remove the stumbling-block. Each subject used a different product or different information; the product was evolving as a result of the testing. As a result, each test subject provided a unique set of reactions; it is difficult to make any generalizations from this testing.

We put a croquet lawn with artificial turf on the lab floor, and found two test subjects to play a game of croquet.

The first problem: identifying each player's ball. In earlier testing only one person had played, so there had been no problem. We painted the balls and ran another test. The second problem: a crafty player hit his opponent's ball, claiming it was his ("I always had the blue ball"). We painted the mallets to match the balls. The next subjects successfully completed a game.

FORMAL EVALUATIVE TESTING

When the product is stable, and the product and information have been through development testing, you want to know whether the product and information have met the objectives set for them at the beginning of the process. By testing a reasonable number of people in a controlled setting that is like their work environment, in a test that is a realistic grouping of tasks and materials, you can tell whether you have met the objectives and where there are difficulties. During this kind of test, every subject gets the same materials, the same briefing, and the same amount of support. Test results can be compared and analyzed statistically.

The pitfall in this kind of testing is that it is based on assumptions that may not be valid. You have a description of the kind of people who will use the product and information, but if the product is not yet available, you don't know who will really buy it. You also don't really know the environment in which it will be used.

For the croquet set, the first version was used at Court, as an entertainment for the Queen, therefore the expected buyers were courtiers. In fact, playing with the Queen had spoiled their view of croquet; it was the gardeners who thought it would be fun to play croquet if the Queen wasn't around.

Another problem is that you may not be able to test with the typical user or environment. For practical reasons, you may have to use local people who are as close as possible to users. You may have a problem duplicating the environment; you can set up a small office in a test lab, but how do you set up a vast machine room?

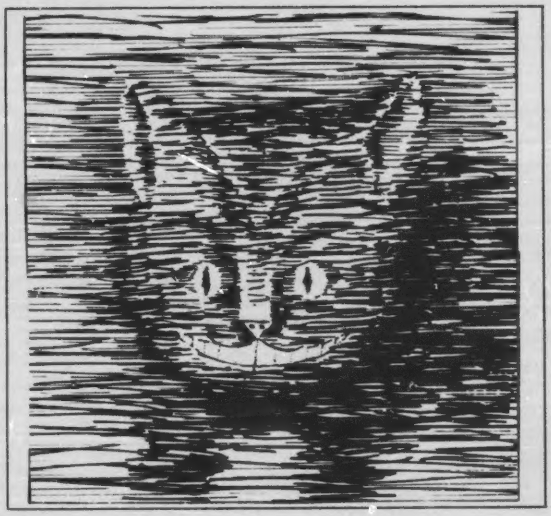
However, having done the best you can to set up an environment, set up reasonable test scenarios, and find test subjects, you now actually do the tests, measuring those things which you have set as criteria, including test subjects' feelings about the task: was it hard, was it what they expected, and so forth.

You need to decide how many test subjects to run, so that individual differences are not overpowering in the test results. If your results are close to each other, you do not need as many subjects as when there are large differences in results. A statistician can give good advice on this.

We decided to test 5 games of croquet, with teams of two people each and another person as a referee. Criteria for completion were that the game should be rated as good by all players, that it should finish in one-half hour, that there should be no more than one argument about rules, and that the referee should emerge unhurt.

One game was not counted in the results because of the special skill of the referee.

Times for the games varied from one-half hour to one and a half hours, and there was never more than one argument. In one case, the argument continued throughout the game. However, games that lasted longest were rated as better than short games by everyone except the referee. That raised some question as to whether 1/2 hour was a good criterion.



SETTING TEST CRITERIA

You can see how closely this kind of testing depends on the original objectives, otherwise you do not know what to test and how to judge success. The objectives are translated into detailed criteria set before you test. The criteria define what you will measure. Criteria are normally expressed in the amount of time taken to do something, the number of errors made, and the users' attitude after doing the task(s).

Some criteria are easy to set, either because the task is common or the circumstances impose limits. Two tasks may need to take similar lengths of time so that work can be paced in an office, or the time to do the task by current methods may give an upper limit for a new way to do the task. Other objectives are likely to be phrased in unmeasurable terms such as "easy to read" or "information should be easy to find." You must then express them in measurable terms, such as:

- how long it should take someone to find a particular item of information
- how many index references they should need
- how many manuals they should have to look in.

How do you know, when you have set the criteria, whether they are acceptable to users? How do you know the criteria are not too high? Are you setting a performance that is unrealistic? You can do general experiments, finding out (for example) that there is some length of time rated "acceptable" by a large number of test subjects in a large number of cases, or you can test people on your product and then find out whether the users' evaluation is that it is easy to find information for this product.

VISITS AND SURVEYS

Users' evaluations are gathered by asking users questions. There are a number of ways to ask people questions, and they all have advantages and disadvantages. What you would like to find out is:

- what sort of people really use the product
- what those people like and dislike about it
- how they feel about its performance (how good were the objectives)
- how they use the product -- environment, tasks, division of efforts and responsibilities

As part of the lab test, you can ask the test subjects about liking and performance, but you cannot verify that they are typical users. After all, you decided who the test subjects ought to be, and what tasks they should do.

By visiting customers you can find out who they are and how they use the product. You can also ask them how they feel about it, although sometimes they are too polite to answer fully and honestly.

You can also send out questionnaires or put comment forms in the books. If you can motivate people to reply, this is a good source of information. In many cases, however, the very satisfied and the very frustrated users reply, so that you do not have a fair sample of users on which to base conclusions. That is also true of mail surveys unless you can somehow elicit responses from everybody.

We have found that customer visits are extremely useful for finding out who the users are and how they use the products, and particularly for defining the environment in which products are used. It may be difficult to get opinions on specific tasks because the people you talk to may not be the ones who do the tasks you are evaluating. Even so, customer visits are always enlightening.

The Queen of Hearts was an early customer. When we visited her to find out how she liked the new-model croquet set, we learned that she had been surprised to discover that her old croquet lawn was not adequate. Nowhere in the information had we said that a croquet lawn must be flat. In the old game, the absence of a flat lawn was never noticed, and in testing in the lab we had a flat floor.

We were told that there were a number of ambiguities in the rule book. All customers felt that this was an advantage, and that the game would be less interesting if the rules were clear.

When the Queen was away, other players asked us to include a statement that the maximum penalty given in croquet was losing three turns. This would keep the Queen from beheading too many players. We agreed that would make the game more user-friendly.

Telephone surveys have the advantage that there is little personal interaction so that the user being interviewed tends to answer questions more honestly. People answering a telephone survey do not know what answer the interviewer wants. Telephone surveys can also reach a large number of people quickly. The disadvantage is that the results are sometimes difficult to interpret; there is no chance to find out what someone really meant, and comments are sometimes cryptic. From surveys it is difficult to get a good picture of the users' environment and work tasks. If the original questionnaire was set up with poor assumptions, you can't find people to answer the questions, or you can't interpret the answers.

A mix of visits and surveys often does well. In particular cases, different methods may be better. But however you decide to get feedback, you should do so. The feedback will correct your misconceptions, identify your users, and define the environment. You will discover that your readers want very different information from what you thought, that they are not at the level of technical expertise that you thought (not always less expert than you thought, either), and that their plans for the future are not what you expected. Having learned all that, you are better able to design and write more usable information for them.

Software and Documentation Usability Testing

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Abstract

This paper focuses on the testing process for usability as it is conducted at IBM Kingston. Strategy formulation, scenario and questionnaire development, test subject selection, pilot testing, test administration procedures and problem tracking and reporting are the main elements of the testing process. The techniques outlined in this paper can be applied to both documentation and end-user interface testing.

Introduction

Usability testing is the vehicle by which software or information developers can determine whether or not a product's software and associated documentation are easy to use. The end-user interface is that part of the software which is evaluated for its ease of use characteristics. This interface may be a panel driven interactive facility or may be command oriented. The documentation associated with the software can be online documentation and/or hard copy documentation. Usability tests are conducted for each of these areas of a product. For example, a usability evaluation may be conducted to assure the ease of using the hard copy documentation. For more information on the type of usability tests conducted for all areas of a product, refer to "An Information Developer's View of Usability Testing" by Bernice Casey in these *Proceedings*.

The testing process described in this paper can be applied to both documentation and end-user interface testing. The intent of this paper is to describe this testing process as we have defined it at IBM Kingston. This is a generalized treatment of the steps involved in usability testing and should be viewed as such. Although the testing process has yielded valuable results, we are continually looking for ways of refining it.

This paper is divided into the following sections:

- People Involved
- Strategy Formulation
- Scenario Development
- Questionnaire Development
- Test Subject Selection
- Pilot Testing
- Test Administration
- Problem Reporting/Tracking

People Involved

At IBM Kingston, the usability test team generally consists of:

- Software developers, who are often directly responsible for designing the end-user interface.
- Information developers, who write the publications and tutorials, and who either develop or edit help panels.
- Assurance and Usability personnel, who play key roles in all phases of usability testing ranging from scenario writing, through problem follow up.
- Human Factors personnel, who run the Human Factors Lab and often administer the tests.

In the tests, it is important to distinguish between objective and non-objective observers. For instance, in end-user interface testing, software developers are directly involved in the tests because they write the code that supports the interface. As such, we can consider them non-objective observers. They know the code so well that they cannot always see it through the user's eyes.

The same is true for documentation testing. In this case, the information developers are non-objective observers. They understand what they have written and so cannot always perceive the concerns of end-users.

Non-objective observers are important to the tests. In order to understand the problems, they should experience, first hand, the context in which the problem occurred because they are the technical experts who must resolve the problems. However, tests that are conducted and observed solely by non-objective observers run the risk of becoming biased.

As a balance, the test team also consists of members of the Assurance and Usability departments as objective observers. Their primary objective is to ensure that the product is thoroughly evaluated for ease of use. They take an active role in designing and refining the tests, and in helping software and information developers isolate usability problems. They also recommend solutions to problems.

Finally, members of the Human Factors department play an important role in maintaining the Lab, scheduling Lab time, selecting test subjects, administering the tests, and assisting with problem tracking. They too act as objective observers who help reduce the variables that can bias a test.

As the discussion above indicates, it is important that the responsibilities of each member of the test team be clearly defined. Even though the members have different roles in the work environment, they must function smoothly and efficiently as a team.

Strategy Formulation

The first step in the testing process is the development of the usability testing strategy. This strategy is documented in a strategy plan which all the test team members review. The formulation of the strategy is important at this stage in the testing process because it defines and identifies the following:

- Purpose of usability testing
- Description of the user class(es) defined for the product
- Test team members and their responsibilities
- Objectives and measurable criteria
- Testing methodology
- Dependencies
- Testing Schedule

The purpose of testing should be well documented so that everyone has a good understanding of the end objectives. A description of the user class(es) defined for the product is also needed so that scenario development and test subject selection can be effective. The roles of the test team members should be documented in the strategy plan as well. This will ensure that all involved are aware of their responsibilities and are working as a team to meet the objectives defined in the test plan.

For usability testing to be effective and valuable, the objectives must be defined by the test team. The objectives are really goals you want the product, end-user interface and/or documentation, to attain. For example, an objective for the task of customization could be that it is easy to do and can be done in a short period of time. Associated with objectives are measurable criteria, where a criterion for the above example would be that the total time to complete the customization task must take two hours or less. The formulation of measurable criteria is not an easy task; however, it should be treated as an important one. Our experience at Kingston has demonstrated that one effective method of defining measurable criteria is to base them upon data collected from the testing of previous releases of the product and/or data collected from similar products. With this data, you can define benchmark measurements and arrive at a method for collecting the data. The measurable criteria should be better than the benchmark measurements. This also allows you to determine how the product's usability compares with similar products or previous releases of the product. Therefore, a recommendation for all usability testing would be to keep a permanent log of all data collected so that it may be used in future related testing.

The methodology that will be used for testing should be documented in the plan as well. The methodology describes the activities that will take place such as scenario development, selection of test subjects, and the types of usability testing that will be conducted. The methodology is actually the testing process that will be implemented for the usability evaluation. Dependencies and schedules should be included so that all are aware of the prerequisites and dates that affect their activities.

Scenario Development

At this point, the strategy plan for testing has been defined. The next step is the development of the scenarios.

The scenario describes to test subjects the environment in which they are working, the overall tasks they are to perform, and the facilities they should use to accomplish the tasks. The scenarios play an important role in the tests. When writing scenarios, your objective should be to make the scenarios as realistic as possible. The scenario should represent tasks that are performed at a customer location. In effect, this allows you to simulate the customer environment so that you can actually see any problems that may be encountered. This allows the test team to identify usability problems during the testing process rather than discovering them after the product has been released to the field.

Once the scenarios have been defined, they should be inspected before they are used in testing. The scenario inspections are conducted to allow all test team members to become familiar with and understand the tasks the test subjects will be asked to perform. The inspections process also is used to ensure that the content of the scenarios are technically accurate and cover all areas that require testing from a usability point of view.

Questionnaire Development

In order to accurately evaluate the ease of using the end-user interface or documentation, the test subject's perception of the product and its usability must be determined. Obtaining this information is normally done through questionnaires. The questionnaire consists of statements that pertain to the tasks the test subjects will be asked to perform. A scale is used where the test subject will be asked to rate the statements based on how strongly he or she agrees with them. An example is: "I always understood the messages I received." The test subject would then be asked to rate this statement on a scale of 1 to 5 where 1 is "strongly agree," 5 is "strongly disagree" and 3 is "neutral".

At IBM Kingston we have found that designing questionnaires in a statement format has advantages. When individuals participate as test subjects for a long period of time performing a specific task, they probably will not remember all of the usability problems they encountered. Their main concentration is on completing the task. The statements remind the subjects of problems they may have encountered and encourage them to respond with as much as accuracy as possible. Another advantage of the statement questionnaires is the measurement scale used. Having each test subject rate the statement on a scale allows the test team to statistically measure the user's overall attitude towards the product.

The questionnaires are usually defined by Human Factc and Assurance personnel to ensure that biases do not affect the validity of the questionnaire. When completed, however, all test team members inspect the questionnaire to become familiar with the content.

Test Subject Selection

Test subject selection is another important part of the test process. Inappropriate test subjects can invalidate the tests. For instance, if you want to test the usability of a system programmer's manual, you should select test subjects who either are system programmers or who have had experience as system programmers.

On the other hand, if you want to test an end-user interface that is designed for people with no computer background, it would be unwise to use experienced computer science professionals. Their feedback will not be indicative of truly novice users.

The main idea to keep in mind is that the usability test should be as realistic as possible. The test subjects that you select should be representative of the customer audience for each task.

Pilot Testing

There are usually two stages of usability testing: pilot testing and the actual usability evaluation. Pilot testing is the preliminary activity for the actual usability testing. The main objectives are to provide early feedback on any major problems that may exist and to "test" the testing process.

Specifically, pilot testing serves the following purposes:

- Identify major software and documentation problems which may exist and report these problems to the appropriate individuals so that they may be fixed by the time the actual usability test begins.

- Ensure that the test scenarios are realistic and unambiguous in their instructions to the test subject.

- Ensure that the daily schedules defined for testing are achievable.

- Allow test team members to become familiar with testing procedures, observation techniques, and problem reporting/tracking.

- In general, demonstrate that the overall process will work.

Test subjects selected for pilot testing are usually test team members who are familiar with that area of the product which is being tested.

Test Administration

When pilot testing has been completed, the actual usability test is ready to begin. The scenarios and questionnaires have been defined and inspected and the test subjects have been selected.

Usability tests should be conducted in a controlled environment. At IBM Kingston, the Human Factors Lab is used. The test administration process is as follows: The test subject arrives at the scheduled time, is introduced to the observers, and acquainted with the Human Factors Lab. The test administrator discusses the purpose of testing and that area of the product which is being tested. At this point, it is essential that the test subject be told that this is not a test of his or her ability; rather, it is a test to determine the usability of the products. The scenario is then reviewed by the test subject to ensure that there are no remaining questions prior to commencing the test.

Now the test is ready to begin. The test itself is video taped and observers also document their observations throughout the test. The test may be observed through a one-way glass and/or on the video camera in the observation room. It is important to note here that there should be no interactions between the test subject and the observers or test administrators, with one exception - the help phone. The test subject is told, before the test begins, that if a problem is encountered during testing where a solution cannot be determined by the information provided, he should use the help phone to call the help desk.This is set up like a customer location where, when required, IBM's assistance in problem determination and resolution is available.

When the test subject feels that he has completed the task, a debriefing session takes place. During this session the questionnaire is verbally administered to the test subject and feedback from the test subject is encouraged. All observers participate in this session and will usually ask questions about problems the test subject encountered during the test. This allows everyone to have a good understanding of the problem from the test subject's point of view. Problem resolutions may also be discussed.

Problem Reporting/Tracking

As previously stated, one of the most important factors in usability testing is obtaining as much feedback as possible from the test subjects. Upon the completion of each usability test, the problems are discussed among all observers and test administrators. The problems should then be entered in a problem log where all test team members can review the usability problems encountered during each test. The problem log should classify the problems as documentation problems or software problems. The problem status should also be documented in the log. The status of a problem may be "fixed," "awaiting the results of additional testing," "in progress," or "rejected" meaning rejected by consensus of the test team.

The problem log should be carefully reviewed by the test team for the duration of testing. In particular, the status of the problems requires special attention. The status assigned to each problem should be defined and agreed to by all test team members. Problems that persist should be followed to an agreed-to conclusion.

Closing Thoughts

This paper described the testing process used at IBM Kingston for conducting usability tests. We are continually refining these procedures as we gain experience. It is our hope that others working in this area will share their experiences too. We feel that this information can be used and shared by others.

The Test-Driven Information Developer

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ABSTRACT

A new, possibly useful, image is presented of the writer or developer of technical information as "test-driven." The test-driven information developer sees objectives, prototypes, drafts, and finished information as test-objects-in-progress, a series of developing hypotheses. An ideal view of a test-driven information development process might consist of seven stages: setting objectives and writing a test plan, testing prototypes, testing while writing, task-oriented testing of early drafts, testing against specifications, task-oriented testing of final drafts, and testing in the user environment. A test-driven attitude implies having the will and the resourcefulness to test in less than ideal conditions on a tight schedule.

A NEW SELF-IMAGE?

Here it comes...the technical manual, being test-driven over challenging terrain! Zoom!...there it goes now down a critical user path into the tunnel of surprising behavior straight up into the index-using octopus....! and down through the overview skipper, the persona piercer, and the example exhauster. Bursting through the last paper obstacle, here it is...Your Manual, shinier than ever from use! And is that you getting out...taking off your goggles, white scarf floating in the wind? Yes, it is you, the test driver, the information developer! A faint smile plays across your lips.

Or: you've just invented a new, perhaps revolutionary, procedural format, and now, through one-way glass, you watch someone trying out your new idea. Will they complete their task in a new record time using your approach? You make notes, the minute and second hands turn. The subject finished, you note that, yes, it is a new record time. Life will now be just a little bit simpler for some people. A faint smile plays across your lips.

You as Walter Mitty? Or as the brave new information developer, the technical writer of tomorrow?

To your wardrobe of self-images, consider adding: the "test-driven" information developer, the information planner or writer whose impelling attitude about a project is that it's an opportunity to do something better than it's been done before, possibly to learn something absolutely new, and, not incidentally, to deliver technical information with a confidence that can come only with testing. With this test-driven attitude, your every act becomes concentrated on the need to develop something for the purpose of testing it, the result of your work seen constantly as "test object."

IT MAY BE MORE FUN

While there may well be equally valid self-images and impelling attitudes, I believe that those who have consciously or unconsciously donned this self-image find that being "test-driven" is likely to make life more interesting. More than that, I would suggest that, with this attitude, the occupation of developing and presenting technical information need no longer be thought of as merely useful, but also as adventurous, experimental, and leading-edge, and just possibly even a bit romantic. Testing implies change from weary old formats to something better, the chance to try out your long-harbored ideas, to see, for example, how much color adds to black and white, perhaps to learn something you never knew about how people behave (and how surprising and unexpected human behavior can be.)

BUT WHERE DO YOU GET THE TIME?

Schedules will probably not get longer. The advantage of being "test-driven" is that you may find time for testing that you might not have otherwise. On a short schedule, you may be able to:

- Set measurable objectives even if you have no firm plans to see whether you have met them. There's a good chance that either you or someone else will find the time or resources to see whether the objectives were met. Even if you find you didn't meet them too late to make corrections, you will have learned something for your next project.

- Test one stage while going ahead on the next one. Possibly you can test one chapter of concepts, one procedural section, or one self-contained sequence of online panels while working on the next. If you don't have the time or resources for a formal test, use a colleague as a test subject. Conduct a usability test on a draft during the same time that it is out for technical review.

Once you have established a certain kind of testing as beneficial and success-producing for one project, the time to do that kind of testing is much more likely to become a standard part of future schedules.

Whatever the challenge your project presents, you may want to keep before you an ideal test-driven process.

A SEVEN-STAGE TEST-DRIVEN APPROACH

One view of an ideal test-driven information development process might consist of seven stages. During each of these stages, you are first preparing something to be tested (plans, prototypes, first drafts, etc.) and then testing it. The seven stages I envision are (1):

1. Setting and testing objectives
2. Testing prototypes
3. Testing while writing
4. Task-oriented testing of early drafts
5. Testing against specifications
6. Task-oriented testing of the final draft
7. Testing in the user environment

1: Setting and Testing Objectives

The first stage, the most important, consists of figuring out what you're going to do in the next six stages, writing this down, and testing it.

Setting Objectives: Since your information has a purpose, your first challenge is to find out: what task or tasks will it be used to do? And what are the measurable objectives for each of these tasks? (A simple example of a measurable objective might be: "A user will be able to unpack and set up this product in ten minutes making no more than one self-corrected error. The user will rate the ease of doing the task as 1.5 on a scale where 1 is 'very easy' and 5 is 'very difficult'.")

In order to set these objectives, you will need to know who is going to use the product and its information and where they will be used. You'll probably want to work closely with planners who understand the market and user environments. Together, you should be able to create user descriptions, task descriptions, and measurable objectives for the product and your information. One of the reasons you want to work closely as a team is so that planners, designers, and information developers will all know that achieving the objectives will depend on the product and task design as well as on the information that is a part of it.

You may also want to set information objectives that you believe are predictive indicators of success. (Later, you may be able to correlate these indicators with the results of task-oriented testing and user satisfaction to find out which indicators have the most value as predictors of success.) For online information, such indicators might include the maximum number of menu choices on a panel, the maximum number of text lines on a panel, and the ratio of panels that include graphic figures to those that are entirely text. For printed information, such indicators might include the maximum number of pages in a single manual, reading comprehensibility levels, index-to-text page ratios, and graphics space-to-text space ratios.

In setting product task objectives or information objectives, identify the most critical tasks and objectives so that they will get the most attention when you test.

Writing a Test Plan: The user descriptions, task descriptions, and all product and information objectives should be written down as the first part of your overall information plan. Then, in your "test plan," develop plans and schedules for the six stages discussed below. This test plan is logically part of both your overall information plan and the project test plan.

Testing Objectives and the Test Plan: To test your objectives and test plan:

- Write or act out for a small audience of reviewers a scenario in which a representative user does the tasks using the information you plan to provide.

- Explain your assumptions about users, tasks, and objectives to some people who are representative of the ultimate users and get their opinions about it. If you can't get actual users, get the opinions of sales, service, or support people who are most familiar with the eventual users. This could be done by a formal in-person or phone survey or by contacting people informally.

- Formally distribute the objectives and test plan to all affected parties and inviting them to a meeting or "inspection" to discuss it.

2: Testing Prototypes

Now you have a plan and are ready to begin preparing the information itself. Before you are too far into the schedule to turn back, put your best ideas to the test by building and testing prototypes. A prototype can be a chapter of a procedural manual, a page or two of a reference manual, a sequence of online panels, a "dummied-up" book complete with binding but with only one "real" chapter in it, or anything that you can invent that will be a close sample of what you intend for the final version. Ideally, a prototype of a printed book will include finished looking type and graphics.

How to Do It (Briefly): Prototype information can be tested against task-oriented criteria (if enough information to do the task can be developed for the prototype). Alternative ideas can be prototyped and tested to see which idea works best. If a book you're writing is similar to one that currently exists, compare your new format with the old one. In all cases, a task-oriented test is the best type of test for the prototype just as it is for drafts and the final version. There may be times, however, such as when you are comparing cover or binding prototypes when a task-oriented test will be difficult to achieve, and you'll have to settle for the results of a subjective questionnaire.

At the very least, you should have a clear statement of what you are trying to learn, written test case descriptions, directions for the test subjects, and debriefing questionnaires. You may want to involve other departments to ensure objectivity. You will want to test the test and the questionnaire by trying it out on a pilot test subject.

The prototype testing stage is also your chance to play the role of "scientist" and do some basic research. Very little research has been done in many areas of technical communication: the selective use of color versus black type, alternative page numbering schemes, alternative packaging and binding methods, alternative page layouts, alternative graphic styles, to name but a few. Your research, however limited, may suggest additional research that you or someone else can do more thoroughly later.

Being Resourceful: Ideally, you should have a statistically significant number of test subjects and a well-equipped human factors laboratory with one-way glass and recording equipment. But if you don't, you can still study your prototypes with a few test subjects and simulated hardware (perhaps certain task steps will have to be skipped). Some tasks such as learning, planning, and filling out forms can be done at a desk in a quiet room or other desired environment. Results may be more in the way of insights than hard data; at the very least, you will have set up a user point-of-view.

3: Testing While Writing

During the development of drafts, several techniques can be used to determine how well you are doing as you go along. Either manually or using an automated tool, you can see whether you are meeting reading comprehensibility objectives by analyzing a representative group of paragraphs as you write each chapter; you don't have to wait (and shouldn't) until the draft is finished.

The list of predictive quality indicators that you set as objectives can be used as an ongoing checklist.

Doing peer review on a chapter-by-chapter basis allows one person to review and feed back comments on one chapter while the writer is working on the next one.

Testing while writing can go on during the writing of both first and later drafts.

4: Task-Oriented Testing of Early Drafts

As soon as you have developed enough information with which to perform a task, usually a first draft or possibly a part of it, you will want to see whether it can actually be used by testing it in a laboratory or other controlled environment.

Essentially, this stage of testing is similar to prototype testing but more refined. A task scenario must be defined, test directions, questionnaires, and debriefing sheets written, time and space scheduled, and appropriate test subjects obtained.

The primary objective at this stage is to obtain feedback that can be used to improve the next draft.

Note that, for some tasks such as ordering, or planning, or writing application programs, task-oriented testing can be conducted without the product itself being available.

5: Testing Against Specifications

This is testing or review for technical accuracy and completeness by developers who understand the product technically. This may be thought of as a kind of indicator testing, where the indicators are "accuracy" and "completeness" as perceived by developers. In IBM, we refer to this as the information inspection process and the writer invites "inspectors" to a meeting at which review comments are discussed.

At the meeting, a "moderator" acts as neutral chairman, resolves any differences, and writes an action plan.

6: Task-Oriented Testing of the Final Draft

This is similar to testing of the earlier drafts except that the product is fully available and the task can be done completely without any need for simulation. You might think of this as a "system test."

There are two testing purposes at this stage: first, to see how well you met the task-oriented product and information objectives, and, secondly, to see what final corrections need to be made to the product.

7: Testing in the User Environment

Having delivered your laboratory-tested information to the world, you will want to go out in it to see how it is being received. Unfortunately, real information users are not usually motivated to behave like test subjects and you may find it awkward and time-consuming to observe them doing certain tasks, such as planning, in a real-life situation. The best you may be able to do is to ask questions later and find out what problems they have had.

The best test of your product and its information, however, is not how difficult it was to do tasks, but how satisfied the user was with doing them. And user satisfaction is something that can be tested and measured simply by asking the right questions.

You can prepare a questionnaire for use when making customer visits or telephone surveys (probably the best two methods). You may then want to correlate the results with the original task-oriented product objectives and with your measurement of the indicators that you put in your information objectives. This should allow you to improve your objectives for future projects.

Summary

Being test-driven means being user-driven. It begins with clear and measurable task-oriented objectives and assumes that each stage of work is driven by the need to develop something test-worthy. Planning, resourcefulness, and teamwork with developers are required. You can and should plan to test your information at progressive stages; the earliest testing, though perhaps the most difficult, may save you the most work later. The test-driven approach implies that your information (and the world) is going to get continually better.

References

(1) This view is based on my own experience in planning and writing IBM product information and on IBM's current quality measurement program. The idea of predictive quality indicators and their correlation with subsequent testing is from Dr. Naomi Kleid whose paper, "IBM's Information Quality Measurement Program," is also presented in these Proceedings.

The Changing Role of the Technical Writer

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What does a Technical Writer do? Write, of course. Yet, the word "write" is all encompassing in trying to describe the tasks involved in being able to put words on paper. Technical writers gather information, analyze data, translate technical jargon into understandable English, edit the words of others, organize ideas for logical presentation, decide formats and layout that make reading easy, and coordinate printing and publication of manuals. But, is that all that a technical writer does?

In many companies, the traditional role of the technical writer is being expanded to use the talents and expertise of the writing staff in areas where communication skills are mandatory to the success of a project. This panel explores the changing role of the technical writer in industry and shows through discussion of specific case studies how one company is using their technical writers as technical contributors to their products.

To be technical contributors, however, we must have a clear understanding of the subject matter. To redefine our role, we can no longer survive on communication skills alone. By strengthening our technical knowledge, we open the door to becoming an integral part of the development process of a product or to proposing and implementing our own projects.

By listening to the panelists in this session discuss situations in their company, you will learn how technical writers are contributing to projects in other than traditional ways. You will also learn how successful these changes have been and the benefits to the writers and the products that have resulted from these projects.

This panel will provide useful information to:

- managers seeking ideas for ways to improve productivity and provide more motivation for their writing staffs
- writers looking for ways to expand their knowledge and to find career mobility by changing their role within the organization
- instructors interested in expanding the scope of technical communication curricula to address the working world of a technical communicator.

Flexibility—The Key to Coping with Change in Publication Processes

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The more the author and the professional communicator use increasingly sophisticated electronic tools to create publishable products, the more automation forces the manager to rethink the structure of the technical information organization. What will the roles of writers, editors, compositors, and designers be now that machines can perform many aspects of their jobs? This paper presents the view that technical communication management can—and should—take an active part in shaping these roles. Efforts to redefine compositors' jobs at the Naval Weapons Center are described to illustrate one strategy for dealing with technology-driven job redefinition.

THE CHALLENGE TO CHANGE

As the computer changes the processes of information technology, the roles of technical communicators are changing rapidly to keep pace. Technical information workers face "relentless pressures to update their skills and shift job assignments," the *Los Angeles Times* predicts. "Pay, fringe benefits and working conditions will be good for those who can change, but success will require determination, hard work and far more adaptability than most U.S. workers are used to." (1) The Technical Information Department (TID) of the Naval Weapons Center (NWC), China Lake, California, finds these words more than an idle speculation; along with technical communicators nationwide, our compositors, graphic artists, and writer-editors experience a challenge to change. Technology forces technical communication managers to look hard at the following question:

- What part of the work will trained communicators do now that many of our customers create their own reports, their own vugraphs, and their own project documentation on-line?

Or, stated more simply:

- Does computer technology offer opportunity or threat to the technical communicator?

The thesis of this paper is that technical information management can—and should—take a flexible approach to restructure jobs that technology is changing, perhaps even eliminating. To illustrate a strategy for job restructuring, I will describe what one technical information group is doing about career changes driven by the automation of word-processing and simple copyediting functions.

COMPUTER vs. COMMUNICATOR?

> Although it is clear that automation in general causes dislocation and the need for mobility and retraining in the job market, there is no agreement on whether automation causes a net loss, gain, or simply a rearrangement in the labor market. The basic question is: is there a finite amount of work to be done which must be divided between people and machines, or is there always more that can be done to improve the overall standard of living? (2)

An increasing number of managers, both within and outside the federal sector, are addressing the issue of what computerization is doing to jobs in the publishing business. At previous ITCCs, in the professional journals, and at other technical communicators' forums, a diversity of opinions has been offered on this subject. One school holds that not just compositors, but also writer-editors as we have traditionally thought of them, may soon be obsolete as the computer provides increasing assistance to the scientist or engineer creating a document. (3) Routines already on the market can assist in nomenclature control, page makeup, routine editing (such as for the passive voice or subject-verb disagreements), automatic readability checks, and formatting of manuals or other standard-format documents. Another school points out that instead of reducing the number of information workers needed, the computer may cause increases in these requirements, just as did the telephone, the telegraph, and other "labor-saving" devices. (4) A third school holds that automation, at least in nonprofessional areas, appears to be causing "job de-skilling, and doesn't allow opportunities for advancement where there were such opportunities before." (5) Many technical communicators state the position (mine, by the way) that "garbage in—garbage out" applies just as well to document creation as to any other aspect of computer use. I believe that the complexities of the English language and the low level of writing skill of the average customer for technical communication services will keep the market healthy for technical communication skills that require more individual judgment than the computer can provide.

TECHNOLOGY AND JOB RESTRUCTURING

In the opinion of Vico Henriques, president of the Computer and Business Equipment Manufacturers Association, when a company or agency installs office automation equipment, the tendency is to simply marry high-technology equipment to traditional ways of getting the work done. The proper approach, he argues, is to "forget the typing-pool syndrome; throw away all the old concepts." He suggests that the introduction of office automation equipment offers management a "stimulating challenge," although he admits that innovative job restructuring "will likely rouse up governmental labor-union leaders and people in the Office of Personnel Management who write Civil Service job descriptions." (6)

Personnel specialists in the federal sector have not, as yet, acted to reclassify jobs affected by automation or, it appears, to address the subject in any meaningful way. A 1982 study by the staff of the U.S. General Accounting Office, undertaken because "the advent of microelectronics has created concern that the nature of the work force would change vastly, available jobs would be reduced overall, and unemployment in the long run would be increased," concludes that no comprehensive studies have been performed that identify either how extensively jobs are being affected by automation or how to cope with the fate of workers displaced by automation. (7)

For the past year or so, TID management at NWC has been wrestling with what to do with the trained compositors who have already seen their keyboarding work decline because of a number of related circumstances. As the first word-processing terminals appeared in TID, writers and editors began to create reproduction copy on-line, thus circumventing the traditional customer-to-editor-to-compositor process. A highly technical work force also welcomed the opportunity to use "new toys" to perform many of the writing parts of their jobs. Since the Center covers over a million acres, communicating on-line is a distinct advantage; as more system users achieve the capability to "talk" to TID electronically, more manuscripts reach us already keyboarded to at least a preliminary draft stage.

The situation is further complicated by some preexisting confusion over job functions. Many of the functions the NWC compositors perform are also performed by more well-paid workers who are classified as writer-editors. The writer-editor is more likely to have had formal training in communication skills and to be sophisticated in the nonwriting aspects of a writer's job—such as getting a manuscript reviewed and clarifying customer needs. However, many of the compositors have a fine sense of grammar and style, learned through years of interpreting editorial changes and even, in several instances, "fixing up" manuscripts for poorly performing editors. The typical compositor may be thought of as having an "evolved job,"

> . . . one in which the 'bundle' of duties have come to be arranged in large part to match an existing employee's perceived 'bundle' of abilities and interests. The process of evolution is one in which both organizational factors and individual attributes interact to create an essentially different job than that for which the employee was originally hired. (8)

Thus, although composition orginally resembled typing more than editing, the line between composition and editing has become increasingly blurred over the last several years. Recent events have further blurred the distinction. A time of potential threat has been turned instead into a time of promise through a management strategy to deliberately expand compositor jobs into the editing realm. A number of manuscripts for which the customers specified "light editing only" are now assigned to compositors and are completed with little or no editorial backup. This strategy of fostering job evolution is a makeshift, "bandage" solution to temporarily balance the work with the people. As bandages go, this has been a pretty good one. Most of the compositors were initially enthusiastic about the opportunity to meet new challenges in formerly dead-ended jobs. (A survey of word-processing operators showed a strong correlation between the level of operator satisfaction and increased responsibility and contacts with customers.) (9) However, some measure of their enthusiasm must also be attributed to the implicit promise the evolved job holds for additional pay and prestige.

COMPLICATING FACTORS

TID management has concentrated significant effort over the past year in a search for a better way to redefine the jobs of NWC's compositors. The interim job enlargement strategy has resulted in high employee expectations that cannot, in all cases, be met. Management does have a responsibility to the taxpayer to keep employee salaries within reasonable bounds. In addition, the traditional compositor's keyboarding work has *not* disappeared; at least limited need for trained compositors' skills in page layout and even in typing is likely for some time to come. Management must walk a tightrope, in a sense, to keep some classical compositor jobs open, to keep the incumbents of these jobs motivated, and at the same time to move some of the employees into other types of work.

Conducting a reduction in force or otherwise getting rid of surplus composition staff is not an option to balancing the work load for several reasons, the most compelling of which is that good employees are a valuable commodity. In addition, merit systems guarantee the federal employee certain fundamental rights: two key issues in this context are (1) affirmative action (since the incumbents of compositor positions at NWC are women and generally also over 40 years of age) and (2) protection against arbitrary removal. Career development is not included in this list of guarantees, although evidence exists that federal employees do feel entitled to career-enhancing opportunities. (10)

A simple solution might appear to be to define certain openings for writer-editors, advertise them as dictated by merit selection principles, then fill them from the ranks of the compositors. However, management's informal action to modify some compositors' jobs to flexibly meet changing conditions has caused such a solution to be "overtaken by events." We need to appropriately pay the people who have truly moved over the line from compositor to editor without raising false hopes that *all* compositors can now consider themselves in "bridge positions" leading to professional jobs. A traditional solution to coping with evolved jobs has been to call in the appropriate personnelist to perform a desk audit to determine whether job reclassification is in order. With over a dozen positions that need to be reevaluated, TID could overwhelm the personnelist, who typically takes months to complete a single such audit. Our management needs a faster, more flexible way to cope with compositors' evolving jobs. This coping strategy must also be perceived as a fair one by the affected employees.

FACTORS CONDUCIVE TO CHANGE

Fortunately, a combination of circumstances puts TID in an unusually good position to design and effect the needed strategy. The challenge of rethinking old methods and relationships is one that has already been accepted by the TID management team in connection with ongoing analysis of what automated equipment will best suit the department's needs. A three-member Information Analysis Office is making a 2-year study of all TID functions that could benefit from automation. The study encompasses employee task teams, work-flow analysis, interpersonal troubleshooting, and hands-on experimentation with various types of equipment. The details of this study are outside the scope of this paper, but the effort is worth mentioning as an illustration that TID management is taking action to change *pro*actively, rather than *re*actively.

Employees and management have also joined together to identify and refine operating principles that formalize the commitment to teamwork, to flexibility, and to employee retention–all factors identified with successful companies. Management works hard to foster such organizational traits as those identified in a study of companies listed by Dun and Bradstreet, Inc. as characteristic of superior organizations:

- A strong sense of organizational identity
- Openness to change
- Broad diffusion of authority within the organization
- Orientation to achievement rather than to procedures or ritual
- Emphasis on employee development and advancement
- High performance standards
- Strong support of the company for its employees, of the employees for the company, and of the employees for one another (11)

Participatory management has been suggested as an appropriate managerial response to increased organizational complexity, marked by a turbulent task environment and nonroutine decision-making; "expanding the level of participation in decision-making improves the information processing capabilities of the organization." (12) A "vertical slice" of the organization should be involved in defining what restructuring needs to be done. (13) Leadership should be "facilitative rather than directive." (14) TID appears to be in an excellent position to implement change, then, since technology is already causing changes in the work, management has already articulated a commitment to change, and the management team has already endorsed the idea of employee participation in this change.

One further positive factor, not as yet shared by other federal-sector organizations, is unusual organizational flexibility in the pay and compensation area. NWC is a participant (with the Naval Ocean Systems Center, San Diego) in a personnel Demonstration Project that flexibly implements certain aspects of the Civil Service Reform Act of 1978. A flexible classification system in essence gives the individual manager authority (within the rather broad limitations of the Office of Personnel Management Classification Handbook X-118) to define and classify the jobs of his or her employees. (15) TID management cannot, however, simply reclassify its compositors as writer-editors since (1) other employees in similar situations (such as editorial clerks) would justifiably then expect to be reclassified too; (2) NWC top management, as well as the Office of Personnel Management, would view such an action as irresponsible and therefore would not endorse it; and (3) costs to the customers (costs that are largely set by the level of employee salaries) must be kept reasonably low while the quality of service remains high. In addition, participation in the Demonstration Project does not absolve NWC management of its responsibility to operate under merit principles, which do not allow seemingly arbitrary salary inflation for specific employees.

PROGRESS TOWARD JOB RESTRUCTURING

One problem with implementing a work restructuring project is that most reports on such efforts appear to "utilize a black-box model in describing the actual process of bringing about changes in work, specifying only the inputs and outcomes of the effort and leaving the reader to fill in what happened in between." (16) Although TID managers would no doubt appreciate a blueprint for action, an exciting opportunity for innovation is also offered in this lack of clear-cut guidance.

A more participative approach to job restructuring and management of the resulting enriched jobs is clearly called for. A study of the impact of group norms on productivity identifies the following conditions as among those basic to success:

- All group members who are carriers of the prevailing norm must actively participate in identification of what the new norm should be. (In other words, the compositors and the writer-editors themselves must have a say in restructuring job criteria.)
- Leaders of the prevailing norm system must give leadership and support. (Failure to involve management is given as an inherent weakness in some participative approaches to change.)
- Participants must be involved in the problem. (Implementation of this recommendation in TID would require management to level with concerned employees about fiscal, regulatory, and political constraints.) A task paragraph clearly spelling out the problem is recommended as a good starting point that would allow participants to directly address change strategies.
- Emotions and feelings must be allowed ventilation.
- Implicit changes must be made explicit. (17) (TID implements this aspect of the change strategy with management recognition of the informal job evolution already in effect.)

TID managers and employees are still working on a fair way to cope with job redefinition; also included in this problem are TID's visual information assistants and visual information specialists. How does the manager decide what to pay the trained professional and the skilled assistant who work side-by-side on the same equipment?

The issues raised in this paper are not easily dealt with; indeed the fluid state of the technology that affects these issues may mean that no clear answers are possible for several years to come. However, TID managers and employees, working together, have come up with a policy on career ladders that the concerned parties see as equitable. Extensive meetings of a Career Ladders Committee resulted in a draft policy statement that was distributed to all concerned employees. Subsequent meetings and incorporation of comments allowed all participants to be involved in the problem and to suggest solutions. Consequently employees now realize that the Career Ladders effort will not result in upward mobility for everyone. A more realistic view by concerned employees of their chances to move up does not appear to have resulted in the feared demoralization, probably because a strategy for *qualified* employees to climb the first rungs of the career ladder is spelled out in the new policy.

Key features of this policy include

- An expression of management support and encouragement of career growth and personal development for all employees
- A statement that compositor and visual information assistant jobs are not, in themselves, bridge positions
- A procedure to establish a classification panel of experts in the field to review individual positions where the level and type of work performed are in question
- A detailed description of the work samples needed for panel review of the individual's knowledges, skills, and abilities

Before the panel convenes, determinations must be made by the cognizant manager that the applicable classification standards can be met, that pay rates will be comparable with those of comparable positions in other government activities and industry, that the projected work load will support the position, and that the individual employee's performance is expected to continue at the level proposed.

The agreed-to policy is only now being tried. It may not work. Those concerned in the efforts to date agree, though, that we've learned a lot from the *process*. In these challenging times, flexibility is the key. I'm convinced that as long as we're able to remain flexible and open with one another, technical communicators (employees and managers alike) will face exciting career-development opportunities—"good communication in—good communication out."

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The Changing Role of the Technical Writer in Software Documentation

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The Changing Role of the Technical Writer in Software Documentation

Technical writers in the software field traditionally have relied on standard sources for material, such as plans, specifications, program listings, hands-on time and contact with system developers. While such sources remain valuable, today's writers sometimes need additional ways to acquire extensive firsthand knowledge of the systems they write about. One way is for writers to take part in some phases of the system development process. Writers can assist in system installation and test, fully exercise all system functions, and write error reports and design change recommendations. Such writer involvement changes the relationship between writers and developers. Writers come to be perceived more as members of the development team and less as separate professionals doing a job other than development.

INTRODUCTION

This paper documents the technical involvement of a software writer during a writing assignment. We hope that such documentation will make a contribution, however small, to the body of literature about the technical writing profession. We hope also that it will encourage writers and writer managers to be technically aggressive, and not content to derive manuals from written specifications and minimal developer contact.

Technical details about the system that was worked on deliberately have been minimized in this paper. To include such details would be irrelevant to the points we wish to make. Those points are that writer participation in the software development cycle results in improvements to:

- Quality of information
- Writer productivity
- Writer-developer communication

Some system details have been included when required for clarity. However, it should be remembered that the technical writing approach is being described, not the programming system.

If you want a job done right, the old saying goes, do it yourself. In the technical writing field, we know that this maxim applies only as much as time and opportunity will permit. In the software field, particularly in the area of large systems, the writer's performance is often hampered by various restrictions. The developers are available on a very limited basis. The specs are sketchy and inaccurate. The system under development is off limits to all but certain developers. Functions are added, deleted or enhanced, all in midstream and perhaps without the writer's knowledge. Review copies are reviewed in a cursory manner. And yet, technical writers are expected to produce complete, accurate and adequate publications, on time and error-free. A challenging assignment, to say the least, but one which most writers experience on occasion.

One way to minimize the problems mentioned above is to have the software writer become nearly technically independent of the system developers. The writer then becomes in control of the situation, at least as far as is possible. (We must remember that the developers may sometimes experience major technical setbacks. When that happens, even the most technically astute writer must suffer significant loss of productivity.)

THE WRITER

The writer who participated in this effort is the co-author of this paper: Vicky Costello, an Associate Information Developer at IBM in Kingston, New York. (The other co-author, William Fenwick, is her manager.) At the time the project began, Ms. Costello had about two years writing experience. She had formerly been trained as a programmer, and had completed a twelve week full-time programming course. Such training, while not absolutely necessary for her writing assignment, was unquestionably of value.

The writer also had experience as a technical user (as opposed to an end user, which implies a non-technical orientation) of various programming systems. She also had considerable experience in writing user's guides, system programmer's guides, and software reference manuals.

THE ENVIRONMENT

The work described herein took place in a large company (IBM), in a software development shop that produces fairly large systems for internal use. The systems are tools used throughout the company by programmers involved in producing software products. The particular system we will talk about is a library control system; that is, a system that programmers use to store different levels of program code that they are developing.

Figure 1 depicts the environment. Most users of the system are technical or semi-technical people with an understanding of programming and systems work.

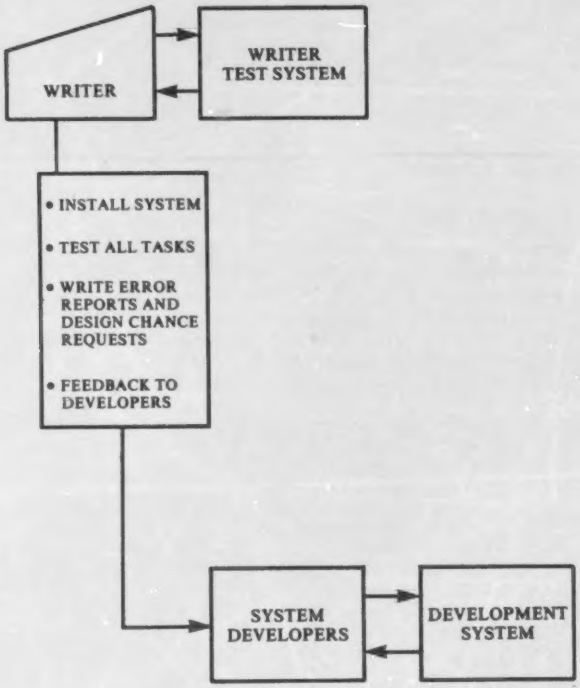
WRITER
WRITER TEST SYSTEM
• INSTALL SYSTEM
• TEST ALL TASKS
• WRITE ERROR REPORTS AND DESIGN CHANCE REQUESTS
• FEEDBACK TO DEVELOPERS
SYSTEM DEVELOPERS
DEVELOPMENT SYSTEM

Figure 1. System Environment

The system was in the middle-to-late stage of development. It ran on an informal test basis. All user tasks had been designed and coded; error messages and tutorials had been written by the developers and were on line.

Two modes of user interface were available: panel and command. The panel mode prompted the user for all information necessary to perform a task. The command mode, which was much faster, required that the user provide, in the form of a command, all necessary information. It was generally accepted that new system users would begin by using panel mode, and would gradually become experienced enough to use the command mode.

Twenty-six user tasks were available from the system. All tasks could be performed in either panel mode or command mode. Up to sixteen parameters were required to successfully execute a task.

THE PROJECT

The project was to write a user's reference manual for command mode users of the system. The audience was defined as experienced programmers and systems people. The book was to contain user instructions, organized by task, regarding commands and their associated parameters (required and optional).

It turned out that while a good deal of information was available about panel mode, very little was available about command mode. This was especially true regarding parameters required, what they meant, and what order they must follow within the command. After a short period of frustration the writer decided to ask the developers for her own installation of the system. She believed that by testing system functions, she could answer her own questions or at least pose better ones. Her request was granted, accompanied by good-humored surprise from the developers.

THE METHOD

It can be noted here that this paper was developed in a retrospective way. The writer kept track of her activities, but there was no specific plan for her to operate the way she did. Her assignment was simply to do whatever was necessary to write a good manual. As her technical involvement increased, management became more aware of that involvement and began to observe the writing project more closely.

The method used was as follows:

1. Install the system, using the installation procedures written by the developers. **Figure 2** shows details.

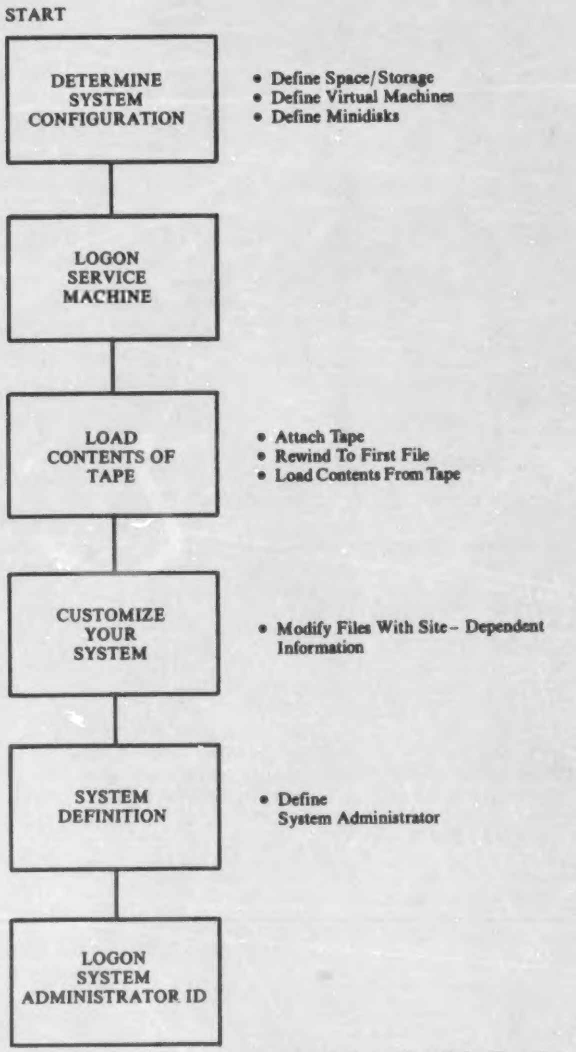
START
DETERMINE SYSTEM CONFIGURATION
• Define Space/Storage
• Define Virtual Machines
• Define Minidisks
LOGON SERVICE MACHINE
LOAD CONTENTS OF TAPE
• Attach Tape
• Rewind To First File
• Load Contents From Tape
CUSTOMIZE YOUR SYSTEM
• Modify Files With Site- Dependent Information
SYSTEM DEFINITION
• Define System Administrator
LOGON SYSTEM ADMINISTRATOR ID

Figure 2. System Installation Procedures

2. Initialize the system by defining system and project administrators, users, and other required data. **Figure 3** shows the various system users.

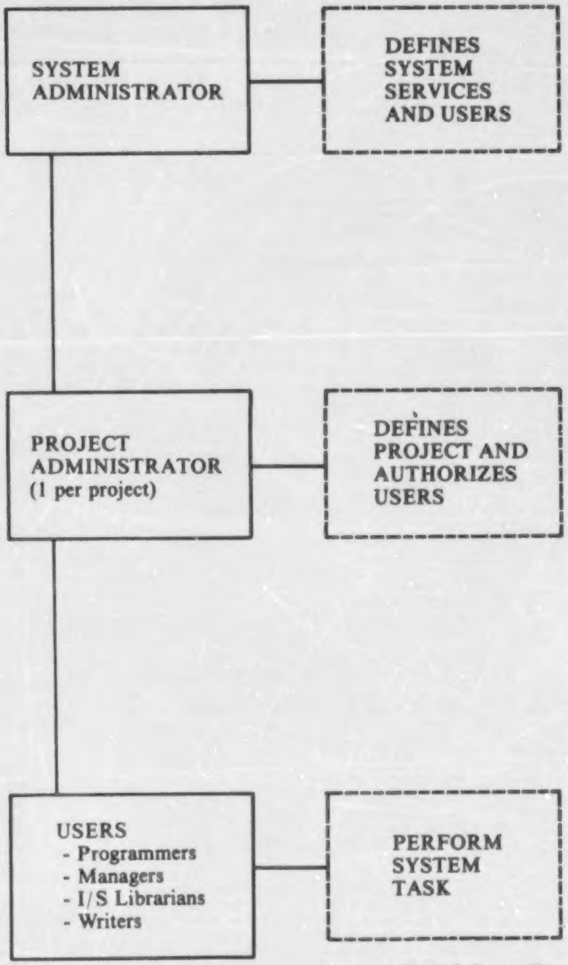
SYSTEM ADMINISTRATOR
DEFINES SYSTEM SERVICES AND USERS
PROJECT ADMINISTRATOR (1 per project)
DEFINES PROJECT AND AUTHORIZES USERS
USERS
- Programmers
- Managers
- I/S Librarians
- Writers
PERFORM SYSTEM TASK

Figure 3. System Users

3. Assuming the appropriate role (manager, programmer, etc.), attempt to execute various system tasks.

4. As a result of step 3, develop information such as expanded task/parameter definitions and detailed usage examples.

5. Test all examples, using combinations of data that real users might have.

6. Provide feedback to system developers, both informally (day-to-day) and formally (error reports and design change requests). **Figure 4** shows some tasks and associated error reports that were generated.

7. Complete the loop by testing the fixes and changes resulting from step 6.

As the project progressed, the writer became an expert user of the system. She eventually knew more about the command mode of operation than did some of the developers. This was partially due to her experience and partially due to development's focus at the time on panel mode and on various technical problems.

The writing of the user's reference manual progressed satisfactorily. The writer's manager observed that programmers frequently stopped at her office to discuss technical matters. They also requested that she test certain system functions not related to command mode, and initiated a good deal of communication that helped her stay abreast of planned changes. In short, she was treated as a regular member of the development team. The developers knew that she could work independently, that she would give constructive criticism, and that she could perform some work the developers normally did themselves. They appreciated the fact that her primary job was to write a manual.

The developers requested advance copies of the manual, for their own use and for the field test users of the system. Overall, the writer-developer relationship contrasted sharply to the near-adversary relationship that occurs all too frequently in the writing arena.

THE RESULT

The user's reference manual was completed on time. It received a thorough technical review that uncovered only a few errors. The manual consisted of about 120 pages.

Quality

Regarding quality of information, the manual received high marks. This is not surprising since it was developed by the writer nearly from scratch, with all tasks and parameters being personally tested by her. She created all of the examples and tested each one. When the writer submitted the manual for review she felt extremely confident that the information it contained was complete and correct.

Productivity

In terms of writer productivity and value added to the development effort, this project appeared to be quite successful. As a result of her effort, the writer identified and corrected many errors in three related reference manuals. Her testing of tasks and other functions served the dual purpose of building her expertise and providing valuable information to the developers.

She was busy all the time, and did not experience significant peaks and valleys of work. She did not waste time going to technical meetings in a vain hope of collecting information, nor did she need, usually, to compete for the time of key programmers. There were no last minute technical surprises waiting to be sprung on an unwary and ill-informed writer. Consequently, the review and subsequent production phase went smoothly.

Education

The writer was well prepared to educate new system users, and did so on an informal basis. On a more formal level, she helped train a new writer, showing him how to use system tasks and answering his questions. This indirectly benefitted the development people and increased the technical base of the writing group.

The writer and her manager agreed that should a formal system course be required, she would participate in teaching the course.

Communication

Communication in a programming development environment can be formal and informal. The formal part consists of objectives, specifications, phase reviews, inspections, and so on. Underneath the formal communications structure, and in many ways driving it, is the informal network of phone calls, technical discussions, and other day-to-day interactions.

It is not unusual for peripheral or support areas to be included in the formal development communications but excluded from the informal communications. In this case however, the writer successfully penetrated the protective wall surrounding development. The resulting benefit in terms of better communication can hardly be overemphasized. Instead of being on the outside looking in, she found herself on the inside, where most of the real communication took place. Because of this, communication problems between the writer and the developers were virtually nonexistent.

TASK	PROBLEM
PROJECT INITIALIZATION	1. Choice of 3 access methods given. • Only one access method supported. • One access method was an editor, not an access method. 2. Optional parameters. • There was no indication that parameters were optional. 3. Capability • System Administrator/System Support have same capability and should not.
SERVICE MACHINE SHUTDOWN	1. Error message was displayed instead of prologue. 2. Requesting shutdown, system asks if user wants to continue. If user enters NO, message is repeated. Program should exit.
USER CATEGORY	1. Message displayed containing misspelled word.
LIBRARY FORMAT DEFINITION	1. Parameters are specified in the wrong order in the prologue and documentation. 2. Incorrect message displayed. • Message displayed is R, but should be DISK DELETED 3. Tutorial incomplete and does not describe fields as others do.
BROWSE	1. When requesting a Browse, message displayed: Wish to continue YES or NO. User enters NO, message is repeated. Program should exit.
EDIT	1. A particular editor is not allowed from command line, but this is not documented anywhere.
CREATE	1. USERS LIST=YES or NO. • User cannot create a USER LIST therefore leaving user with no choice. 2. If two fields are left blank, default is taken on the first create. If creating a delta, the same two fields are required. This is not mentioned anywhere. 3. User is given a choice of one editor but user can choose from two. 4. One field is not explained in detail anywhere. • This field requires special characters and not just any editor can be used. There is no information on this.
PRINT	1. Incomplete tutorial. • Select one or two; however no information is displayed.

Figure 4. Tasks and Associated Error Reports

CONCLUSION

Other, less tangible benefits resulted from this project. The opportunity for more writer job satisfaction seemed to increase. The implications for information planning are uncertain, but it seems reasonable to assume that a base of technically astute writers, with good communication channels to development, would be a plus for planning purposes.

One line of communication that has hardly been touched upon here is the writer manager-developer manager relationship. It is important that the writer manager talk to his peers in development to make sure they understand the role of the writer on any given project. Care should be taken to preserve the writer's identity as a writer. At the same time, technical involvement should be encouraged and appreciated.

The possibility of additional development-type activity on the part of writers no doubt exists. In the environment discussed in this paper, one comes readily to mind. That is to have the writer develop and write test scenarios for the development/test people. This would educate the writer, provide assistance to development, and would be an information development effort.

Managing Creative Individuals

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SPEAKERS

- **Mary E. Cremeans**
  "How To Get More Money From Your Creative Employees"
- **Stewart J. Florsheim**
  "Managing Writers and Graphic Artists In The Technical Environment"

This session covers the many aspects of managing creative individuals in today's fast-paced industry. The speakers address the need for a good work environment, effective affiliation with technical peers and the importance of key motivating factors.

Creative individuals, such as writers and artists, are often faced with the challenge of using their humanitarian and interpersonal skills to successfully complete their work assignments. As managers, we can take definite steps to build teamwork and meet our employees' motivational needs.

Managing Writers and Graphic Artists in the Technical Environment

Stewart J. Florsheim

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Abstract:

As technical communications becomes more and more of a recognized field, it attracts many competent people from the liberal and visual arts. Managers need to give these individuals freedom so that they can exercise their creative skills. These individuals also have humanitarian skills that are rarely recognized, and can have a significant effect on their work and on the organization. Managers must contend with the rift between the artist and the engineer by making sure that each individual is made aware of the other's importance.

As technical communications becomes more and more of a recognized field, it attracts many extremely competent people from the liberal and visual arts. Managers ought to be enthused by their creative and humanitarian backgrounds, yet managing these people in the technical environment has its own particular set of problems. Within the technical communications department, managers need to give these individuals as much freedom as possible so that they can exercise their creative skills. Within the larger organization, managers must contend with the rift between the artist and the engineer. When these creative individuals are left to their own devices and feel as though they fit into the organization, they can make significant contributions to the corporation.

Typically, individuals with a liberal arts or communications background enter the field as technical writers. If they enter out of school, they probably have a degree in English or journalism, and have probably taken a few technical courses. More ambitious students have probably done some extracurricular work, such as on the school paper. A few schools have technical writing tracks, through which a student studies writing, graphic production, and a battery of technical subjects. Individuals with a visual arts background enter the field as graphic artists or designers; they are responsible for designing and producing the manuals and other technical literature.

A usual course of study for these students includes work in subjects that give them a well-rounded, humanitarian background. Students select from topics in art history, philosophy, politics, English, psychology, to name a few, that give them an overview of the humanities and the social sciences. It is through these classes that individuals begin to develop a sense of self within the larger context of a particular discipline. They also develop an overview of how ideas are formed, and how ideas shape individual lives and societal patterns. These non-material skills are extremely useful, and individuals with these skills are only beginning to enter the corporate world through fields such as technical communications.

If these creative individuals are supported in the appropriate way, many of their natural characteristics and skills can come to fruition. These include:

1. An ability to achieve a perspective and see "the larger picture." This is an abstract skill that is learned in the social sciences and humanities. It can be extremely useful when describing a particular system and trying to understand it from a user's perspective.
2. Clear, organized thinking. This is a skill that all good writers have, which is passed on to the user in the form of good manuals.
3. Communication skills. Writers and graphic artists are communicators; they specialize in expressing themselves in a chosen form.
4. Sensitivity. Most individuals with a liberal and visual arts background are taught to be sensitive through their studies and their attempts at self-expression. In turn, they become good communicators, both in their chosen form and interpersonally, within the corporation and with the customer.

Corporate leaders and managers need to be aware of these skills and to support them. To begin with, these individuals require a particular kind of leadership. They usually do not need someone standing over them, telling them exactly what to do. Rather, they need a set of guidelines and objectives that they can work towards individually. The guidelines should include what is expected of them, and how they can achieve those expectations. For example, a writer producing a software manual should be encouraged to learn the system as thoroughly as possible, and to ask questions of the engineers and the end users. Objectives should take into account those of the particular job and of the individual's personal and professional goals.

Although this entrepreneurial approach does not work with all creative individuals, those who want to take initiative just need a vote of confidence from their manager, and then the freedom to proceed at their own pace. The manager does need to be accessible at all times, but as a mentor rather than as a bureaucrat. In the best of all possible situations, these individuals will work hard, and come up with innovative ideas and solutions. They need to be encouraged even if their solutions fail, so that they get up and try again.

These creative individuals can also become very effective managers. Ideally speaking, they have good interpersonal skills and the large perspective gleaned from an arts background. Michael Thomas, former successful investment banker, is citec in the best-selling management book, In Search of Excellence, as he speaks of traditional, rational managers: "(They) lack liberal arts literacy...need a broader vision, a sense of history, perspectives from literature and art...I'd close every one of the graduate schools of business...."

The Rift Between The Artist And The Engineer

One of the key challenges that the manager faces is the rift between the artist and the engineer. Whether the rift is actual or perceived is inconsequential in the face of the potential severity of the problem. Artists often maintain that engineers are too technical and detail oriented; therefore, they are insensitive to others and "not in touch with their feelings." On the other hand, engineers often maintain that artists have their heads in the clouds and cannot possibly understand the technicalities of their work.

The primary manifestation of that attitude is a communications breakdown. The two people who need each other to produce a good product, that is, a well-documented, sound system, are rivals. The best way to overcome the problem is to make sure that engineers know that documentation is part of their job, that is, that a well-designed system is worthless without a well-designed manual. That way, the engineers will understand how important it is to cooperate with the writer. And the writer must try to understand the system, and to make sure that the engineers know that the knowledge is being acquired.

This way, each individual is forced to step into the other's world. As the engineer begins to develop an appreciation of the need for good manuals, the writer develops an appreciation of the need to understand the system. The relationship can be further enhanced if the writer takes the engineer through the steps of writing and producing a manual, and the engineer offers to support the writer if the writer wants in-depth knowledge about the system, or wants to take technical courses.

This is a very exciting time in technical communications. It is, indeed, becoming more and more of a recognized field, which is exemplified by the growing number of universities offering tracks in technical writing, and the number of job openings. In more progressive organizations that realize how critical good manuals are, the gap between the writer's and the engineer's salary is closing. Moreover, the profession is approaching a time when writers and artists will not only be appreciated for their skills, but also for the broad contributions they can make to the organization.

How to Get More for Your Money from Your Creative Employees

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We are in an age of analysis trying to get an overview of the 'sounds of the future'. Your role as a manager is to motivate employees to develop a new approach to the future to overcome current obstacles. The following questions will help you, the motivating manager, to guide your employees toward this goal.

WHAT'S HAPPENING?

- *Increasing quality demands*
- *Faster changes in technology*
- *Tighter economic conditions*
- *Poorer work environments*

In spite of these considerations, you can make more money through creative employees by nurturing healthy conditions.

WHAT'S A MANAGER TO DO?

- *Understand individual needs*
- *Hire motivated people*
- *Encourage teamwork*
- *Reduce stress*
- *Use performance evaluations*
- *Provide training*
- *Communicate the value of company benefits*
- *Compensate wisely*
- *Counsel and show personal concern*
- *Discuss career development for the future*
- *Encourage education*
- *Build self-esteem*

WHAT DO FAILING MANAGERS LACK?

- *Comprehension*
- *Creativity*
- *Communication*

WHAT'S HAPPENING?

The United States is in, what sociologists call, the 'milling stage' where everyone seems to be going in circles. To rectify this situation, you need to stop, take a look over your shoulder, and carefully examine what is happening.

Increasing Demands

As the electronics industry develops into the largest business of all time, communication occupations continue to grow. Society demands higher quality communications to meet the higher volume of information. To prevent uncontrolled and unorganized information that is useless in an information society, technical communicators are becoming data environmentalists, protecting society against the information pollution that is proliferating.

Faster Changes in Technology

The windows of today's opportunity open and close at speeds difficult to manage. Instead of gradual growth, information markets swell rapidly until they burst, rebuild, and develop again. Technical communicators must adapt to survive.

Tighter Economic Conditions

In today's economy society puts a price tag on everything, making certain that there is value received for every dollar spent. Technical communicators are painfully aware of the national concern for belt-tightening at all levels of society.

Poorer Work Environments

In this age of ecology, humans are the only creatures society would ever expect to flourish in an environment that does not provide what is needed! A well nourished seed does not try to grow. It just grows. It does not need self-confidence or self-discipline or perseverance. A seed weighed down with a rock, or planted in the shade, or suffering from lack of water cannot grow into a healthy full-sized plant. Try as it might, at best it can only become a brief statement of its potential. You would not expect a seed to sprout on a bare table top, but the expectations you demand of yourself and your employees are equally absurd.

WHAT'S A MANAGER TO DO?

Managers face an interesting problem; you are held responsible for completing a task, but alone cannot complete it. The contributed efforts of subordinates are compulsory. Today's increased demands make those contributions even more important. You must induce people to contribute their efforts to the performance of the task at hand. This is the challenge of motivation.

You increase your chances of motivating employees when you understand the work-related needs, desires and expectations of people. Meeting your employees' needs helps you meet yours. Blocking needs can result in very negative consequences.

You are doomed to fail in the unfolding future if you remain out of touch with the present. You must develop creative ways to help your employees meet their needs for survival in the continually changing technical field.

Workers are hungry for a workable structure that successful administrators can provide. You must lead potential to maximum fulfillment and channel motivation in the most profitable direction by developing an environment for *CREATIVITY!*

Understand Individual Needs

You need to understand that the first step in motivating employees lies in recognizing that people act according to their own interests as defined by their needs.

Motivating employees to contribute efforts toward organizational tasks requires that you make it possible for employees to satisfy their needs by making such contributions. Identifying a single list of needs is not easy, but there are a few basic categories of needs that are helpful in this endeavor.

Two theories of human needs taught in basic management courses are the Hierarchy of Needs Theory, and the Motivation/Hygiene Theory.

Maslow's Hierarchy of Needs suggests that people are motivated by five distinct types of needs: physiological, safety, love, esteem, and self-actualization. Visualize physiological needs as the bottom rung on a ladder. Each succeeding need is one step further up the ladder leading to self-actualization. Until lower-level needs are satisfied, most people have little regard for higher-level needs.

Physiological - The fundamentals necessary for physical survival. Food, shelter, clothing, wages, salaries, benefits.

Safety and Security - Safety from losing any of the needs listed above. Some guarantee that future needs are going to be taken care of. Stability of employment, understood rules and policies.

Love/Belonging - Need to be part of something, cared about. Our department or division is an important and respected group within the company!

Esteem - Need to be important. Be the best producer (by one's own definition) in the department.

Self-actualization - The need to be in charge of yourself, your work, your life. A need to help participate in decisions on the job rather than be told what and how to do things.

In light of our global community, it must be noted that the hierarchy needs may not be the same in every country. The generalization shown applies to American and British managers. Japanese managers place greater emphasis on social and security needs. Northern European managers reverse the positioning of safety and love. Keep in mind your background as well as your employees background.

The motivating manager identifies needs and potential and channels motivation in the most profitable direction.

Herzberg's Motivation/Hygiene Theory deals with situations where employees feel exceptionally good or exceptionally bad about their job.

Good feelings that motivate people are called Motivation Factors:

- **Achievement** - opportunities to excel, off-the-job achievements.
- **Recognition** - knowledge of employee as a person, his or her opinions and normal performance.
- **Work Itself** - work, proper tools, flexible work hours.
- **Responsibility** - participation.
- **Advancement** - meaningful performance reviews using Management By Objectives (MBOs).
- **Growth** - training, job rotation, suggestion opportunities, out-of-plant assignments.

Bad feelings caused by factors outside the job are called Hygiene Factors. Keeping them in order is necessary to avoid a drop in normal performance.

- **Company Policy and Administration** - benefits, rules.
- **Supervision** - direction, expectations.
- **Relationship with Supervisor** - communication.
- **Working Conditions** - cheerful atmosphere, layout, adequate parking.
- **Salary** - adequate pay scale.
- **Peer Relationships** - social interaction.
- **Personal Life** - role stress.
- **Subordinate Relationships** - communication.
- **Status** - level of importance.
- **Security** - job and physical well-being are safe, safe equipment, proper lighting.

Managers must cope with this entire range of good and bad feelings. However, if you are to increase motivation and performance above the average, you must enrich the work itself.

Hire Motivated People

When you hire, do you obtain motivated workers? In addition to asking yourself, 'Can this candidate do the work?' you must be satisfied with the answer to 'Will this candidate do the work?' Unless a person can and will do a job, all of the motivation techniques in the world will fail. 'You can lead a horse to water, BUT...'

Encourage Teamwork

Dispel rumors and encourage quality circles. Have weekly roundtable meetings. Ask yourself 'What opportunities exist to increase my subordinates' level of mental and emotional involvement? How can I best use those opportunities in light of the situation at hand?'

Employees are seldom asked to help solve these problems:

- How can we do a better job?
- What can we do about high unemployment?
- How can we improve the quality of our products and services?
- How can we reduce costs to better serve the needs of society?

Participation in setting objectives helps establish a basis for trust and improves cooperation.

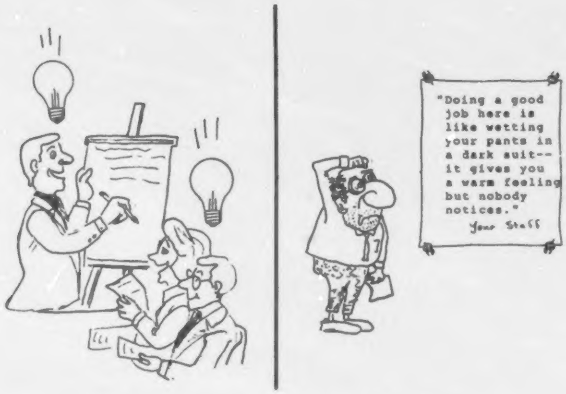
Reduce Stress

The Holmes Stress Scale was developed to help people gauge their stress and prevent unnecessary stressors. It is a valuable indicator and can be used to prevent future problems. This scale is available in a number of publications, including Role Stress.

Use Performance Evaluations

The performance evaluation is one of your best motivating tools providing growth, achievement, recognition, and participation.

- **Growth** - Develops because of your interest.
- **Achievement** - Results from acknowledgement of success.
- **Recognition** - Results from mere fact that you talk and listen to your employee.
- **Participation** - Results from listening to employees ideas.


"Doing a good job here is like wetting your pants in a dark suit--it gives you a warm feeling but nobody notices."
Your Staff

Which employee responses are you getting?

Provide Training

Training is a tool to solve problems. Therefore, all training considerations should begin with an analysis of problems. Match problems to potential solutions.

Communicate Value of Benefits

The biggest problem that employers have with benefits is that employees are unaware of their value. Once you give benefits, make sure your employees know the value of them.

Compensate

Simply stated, the goal of monetary compensation should meet these objectives:

1. Pay enough to hire and motivate competent employees.
2. Do not pay more than you have to.
3. Create a 'feeling' of fairness. Pay and skill should match.

Counsel and Show Personal Concern

Most humans experience some temporary difficulty coping with life. Some personal problems affect job performance. Overlook personal problems, but do not overlook job performance. Be aware of the amount of stress employees are dealing with by using the Holmes Stress Scale. Promote exercise, a stress reducer. Build a quality relationship between management and personnel.

Discuss Career Development For The Future

Career development is critically important in this information age because of the continual state of flux. Your employees can't determine how to get somewhere unless they know where they want to go. Help employees get a clear image of what they want to achieve. Help them set goals. Review them periodically. Perhaps their goals will pave your company's future!

Encourage Education

Education is paramount! Urge employees to keep pace with the world.

Build Self-esteem

Swift said it best, 'Although men are accused of not knowing their own weakness, yet perhaps few know their own strength. It is in men as in soils, where sometimes there is a vein of gold which the owner knows not of.'

Don't criticize, condemn or complain. Build self-esteem with winning words. Your job is not to tear people down, but to push people up.

Participation can improve employees' self-esteem and income on one-hand, and the effectiveness and profitability of companies that practice it on the other hand. You become more effective and gain more self-esteem for yourself and others. NOTE: A person's name is the sweetest sound to his ear. Use it! Listen! Speak in terms of your employees interest. Let employees know they are important.

WHAT DO FAILING MANAGERS LACK?

Many leaders fail because they lack comprehension, creativeness and communication skills. If greater attention is given to these areas, increased production will result.

Comprehension

Reading, talking, studying, attending conventions or local STC meetings, and doing anything and everything to better understand your profession.

Creativity

Manage in the most exciting, imaginative, and thought-provoking way possible. Try new methods.

Communication

Simplicity and enthusiasm are far more persuasive than eloquence. Smile! Be conscious of your body language. You influence your staff. You set the tone. Project the image of a leader. Reader's Digest once published a saying 'Wherever you are, be there.' Exercise, watch your health, and get enough sleep for extra energy. *BE THERE!*

SUMMARY

You, as a motivating manager, must play an active role in the future of technical communications. The future is going to be more stressful than ever, but you can take measures to reduce that stress. Everyone employs a highly personal stimulus to trigger the drive to succeed, but motivating management can determine needs and apply the necessary motivational stimulus to meet organizational goals. You have the tools you need for success. It's time to start using them. Technical communicators can be highly motivated to gain greater profits for you.

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Professional Communication—The Full Spectrum 'From North American Classroom to Japanese Management Techniques'

A. (Tony) Rhodes-Marriott, Moderator

MODERATOR:
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The session explores three key elements in the sphere of business communication — Instruction, Hiring Practices and Administration.

Starting with classroom techniques, the presentations include brainstorming and workshops, successful hiring and real-world Japanese management techniques.

The presenters are all leaders in their respective fields, well versed in theoretical and practical applications within the sphere of technical communication.

The session should benefit all managerial communicators, especially those whose areas of interest coincide with the topics being presented.

If you are searching for new ideas in motivation, ways of minimizing risk when hiring or keeping up to date or comparative strategies "Japanese style", don't miss this session.

Hiring a Technical Editor

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Hiring an experienced technical editor who is well qualified for a particular job opening can be expedited by the seven-step process described here. This paper advises editorial managers to explicitly define the principal qualifications required by the job; it suggests skill areas to be considered and outlines a method of specifying the relative importance of each qualification. Subsequent steps of the hiring process are based on these skill-related qualifications. Criteria for screening application letters and resumes are given, as are examples of focused interview questions. Also discussed are the usefulness of an applicant's work samples and the merits of assembling a diversified interviewing team.

INTRODUCTION

As a manager seeking to hire a technical editor, you are likely to take one of two basic approaches: (1) you will limit your search to experienced editors whose talents closely match your needs or (2) you will consider both the "close matches" and less-experienced individuals who have the potential to fill your needs after on-the-job training.

For a manager who takes the first approach, this paper presents a step-by-step process for finding an experienced technical editor with the desired qualifications. The process provides for systematic comparison of applicants with varied skills, training, and experience.

Designed to make the most effective use of the manager's time as well as to identify the best-qualified applicants, the process entails seven steps:

1. Explicitly define the qualifications for the job and rank them in importance,
2. Actively seek a large pool of applicants,
3. Rigorously screen resumes and application letters to identify the top few applicants who will be interviewed,
4. Ask for samples of work from those to be interviewed,
5. Assemble a diversified interviewing team,
6. Focus the job interviews, and
7. Rank the interviewed applicants according to how closely their abilities match the desired qualifications.

While this method can be applied to many hiring situations, most of the specific suggestions and examples provided here are based on the assumption that the manager is limiting the search to applicants who will require a minimum of training.

HIRING A TECHNICAL EDITOR: STEP BY STEP

Step 1: Explicitly Define the Job Qualifications

A clear and concise job description is invaluable to the manager seeking to hire an editor. The one- to two-page job description should clearly define the main job activities and the qualifications an editor needs to carry out those activities.

In defining the qualifications for the job, first compile a list of necessary skills (see Table 1). Next, specify the degree of expertise needed in each skill area. For example, the job might call for "exceptional copy editing ability" but only "limited layout skills." After defining the skill levels in this way, you will have a set of qualifications against which you can systematically compare applicants.

Two additional qualifications will be the minimal requirements for education and experience (minimal, *not* optimal). While education and experience

Table 1 Examples of Skills to Consider when Defining Qualifications for a Technical Editing Position

Ability to do original writing
Ability to get along with people
Ability to manage personal work load
Ability to rewrite accurately
Attention to detail
Conversational skill
Copy editing ability
Depth and breadth of technical knowledge
Design and layout skills
Familiarity with typesetting and printing
Knowledge of principles of language usage
Proofreading ability
Speed of editing

contribute significantly to the skill-related qualifications discussed above, they also should be considered separately.

You may find it helpful to go one step farther and assign a numerical weight to each qualification. As discussed later, this weight can be used to derive - an overall measure of an applicant's suitability for a particular job opening.

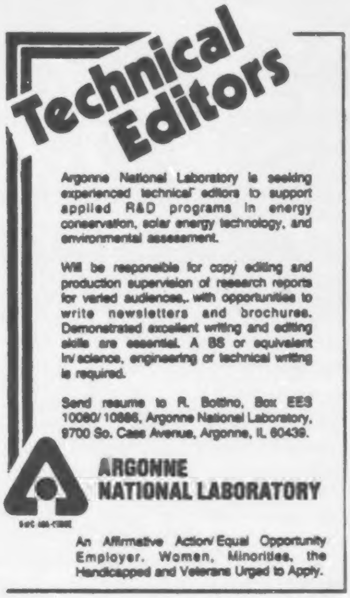
Step 2: Seek a Large Pool of Applicants

Your chances of finding a qualified editor for a particular opening are best if you have at least 30 applicants. Prominent, well-designed display advertisements in major newspapers are generally very effective (see Figure 1). Applicants also can be sought through professional contacts and by advertising in STC chapter newsletters, *Technical Communication*, and *Science* and other technical publications read by editors.

An effective ad will briefly indicate the type of editorial work to be done, the technical subject area, and the basic qualifications. Examples of qualifications to include in the ad are minimal educational and experience levels and the two or three editorial skills you value the most.

Step 3: Rigorously Screen Resumes and Letters

Resumes and application letters should be screened rigorously on the basis of quality of writing in the resume and letter, relevance of experience and education to the job activities, and stability in job history. A little extra time invested here will save considerable time later, by reducing the number of applicants to be interviewed.



Technical Editors

Argonne National Laboratory is seeking experienced technical editors to support applied R&D programs in energy conservation, solar energy technology, and environmental assessment.

Will be responsible for copy editing and production supervision of research reports for varied audiences, with opportunities to write newsletters and brochures. Demonstrated excellent writing and editing skills are essential. A BS or equivalent in science, engineering or technical writing is required.

Send resume to R. Bottino, Box EES 10080/10886, Argonne National Laboratory, 9700 So. Cass Avenue, Argonne, IL 60439.

ARGONNE NATIONAL LABORATORY

An Affirmative Action/Equal Opportunity Employer. Women, Minorities, the Handicapped and Veterans Urged to Apply.

Figure 1 Sample Advertisement for Technical Editors (from *Chicago Tribune*, March 9, 1980)

The following two-step approach is the quickest and most effective way to screen a group of resumes.

- *Step 3.1*. Read the application materials once and sort them into two groups — those from applicants who meet your minimum standards and those from applicants who do not. The minimum standards typically would be (1) an error-free resume and letter, (2) satisfaction of minimal requirements for education and experience, and (3) reasonable stability in holding jobs. Reject applicants who do not meet these criteria.
- *Step 3.2*. Study the surviving resumes and rank the candidates in an approximate order of "promise."

Points to consider in both steps of this process are discussed below. When you complete the screening process, you should be able to identify the top three to five applicants; these are the people you will interview.

Quality of resumes and letters. It is fair to assume that job application materials from prospective editors represent their very best writing and editorial efforts. An editor who submits a flawed resume or letter merits no further consideration. Errors that constitute reasonable grounds for rejecting an applicant for an editorial position are suggested in Table 2 (Step 3.1). The table also indicates measures to consider in ranking the quality of well-written resumes and letters (Step 3.2).

Education and experience. In Step 1, you specified the rock-bottom requirements for education and experience. After eliminating applicants who do not meet these standards (Step 3.1), carefully consider the many combinations of schooling and experience you found among the remaining candidates. Look for similarities between each applicant's background and your needs. Remember that an editor who has excelled in one of the many subfields of technical communication may not do well in an unrelated subfield.

Table 2 Measures of Quality in Resumes and Letters Submitted by Editors

Errors that Justify Rejection

Fundamental grammatical errors, such as:
  Lack of subject-verb agreement
  Violation of basic rules of syntax
  Incorrect choice of words
  Violation of basic punctuation rules
Incomprehensible sentences
Inconsistent typographical style or format
Spelling and typographical errors

Considerations in Ranking Applicants

Conciseness
Overall quality of prose
Usefulness of information provided
Visual effectiveness of resume format

An applicant's background in both editorial and technical fields should demonstrate an ability to edit your employer's technical text with understanding and accuracy. Compared to your job opening, consider whether the applicant has:

- Edited material for similar audiences,
- Edited material on similar technical subjects,
- Had relevant schooling,
- Worked in a similar type of publishing environment,
- Worked under similar deadline requirements, and
- Handled similar production tasks.

A good resume will provide this basic information. However, you still must infer — primarily on the basis of the applicant's education and experience — whether he or she is likely to possess the qualifications you defined in Step 1. Systematic comparison of each applicant's educational and work history to your list of job qualifications should enable you to produce a very rough ranking of the applicants on this basis (Step 3.2).

There is no magic combination of education and experience that qualifies a person for a particular technical editing position. However, because there are similarities among editorial jobs in different organizations, I will summarize my experience in hiring 15 editors (and interviewing at least 30 more) over the past eight years.

Technical editors at Argonne National Laboratory edit papers and reports written by Ph.D.-level scientists and engineers. These publications are most often read by technical audiences that may be either highly specialized or interdisciplinary. In hiring editors to work in this environment, I have had the most success with applicants who have at least three years of editing experience in a publishing environment plus:

- A degree in technical communication,
- One degree in science and another in English or journalism, or
- A degree in science or engineering.

Stability of Work History. In hiring anyone for a permanent position, it is only prudent to place a high value on a stable job history. An applicant who has repeatedly changed jobs every two to three years, and who gives no indication that this trend will change, should be moved to the bottom of the list (or perhaps simply off the list).

Step 4: Request Work Samples from Applicants to Be Interviewed

Actual samples of an applicant's editing, combined with information from the resume and job interview, often can help you reach a hiring decision. When inviting the top three to five applicants for interviews, ask them to bring samples of documents they have written or edited, each labeled to indicate the nature of their contribution. The most useful sample shows the same text both before and after editing. While some applicants will not be able to bring this type of sample to the interview, it is still worth asking for.

Provided that your company policy does not forbid it, you also can obtain a "before and after" sample by giving an applicant a few pages of representative text to edit, either at home or in your office. If all applicants are given the same sample pages to edit under the same conditions, you will have an excellent opportunity to compare their editing skills.

Step 5: Choose Interviewers with Varied Perspectives

Selecting interviewers with different perspectives on editing is generally an effective way to arrive at objective evaluations of applicants. This approach also gives an indication of the applicants' ability to interact with different types of people. The applicants might talk to the editorial manager, a fellow editor, an author, and a staff artist. If the subject matter to be edited is highly technical, applicants should be interviewed by a specialist in the appropriate discipline. The same team of interviewers should meet all the applicants.

Step 6: Focus the Job Interviews

Getting the most information out of the job interview is always a challenge. Because interviews can easily meander out of control, plan the interview questions in advance and write them down. Refer to the list during the interview.

Good interview questions are specific, nonleading, and impossible to answer with a "yes" or "no." Each question should elicit information that is directly related to the job qualifications. Table 3 gives examples of focused interview questions for a technical editor.

As the editorial manager, you should interview each applicant first and provide an overview of the working environment and the type of job to be filled. Let the applicant know what the job entails -- but not what the qualifications are.

Give the applicant ample opportunity to ask you questions, and offer a chance to tour the editorial office area. Remember that you are "selling" your job as well as evaluating the applicant. Depending on your employer's personnel policies, it may be appropriate for you to inquire about the applicant's salary requirements.

Take a few minutes to look over any work samples the editor brought and make sure you know exactly what his or her contribution was. Keep the samples to examine in more detail, but mail them back within a few days. If you plan to give the applicant text to edit for you as a "test," the end of the interview is the best time.

If you did not take notes during the interview, write down your impressions and the information obtained from the applicant immediately after the interview, for later reference.

Table 3 Examples of Focused Interview Questions for a Technical Editor

Area	Sample Question
General experience	Why did you go into the field of technical editing?
	What do you enjoy most about editing?
	What are you looking for in a job right now?
	What are your long-range career goals?
	Do you prefer writing or editing? Why?
	What types of audiences have you written or edited for?
Technical training	Your technical training is in the field of ____. Why did you select that field?
	Would you like to return to pure technical work if you had the opportunity? Why?
Language and editing skills	In previous jobs, what kinds of grammar and usage problems were you expected to correct?
	What kinds of language problems did you encounter most often, and how did you deal with them?
	How do you go about tailoring the vocabulary in a manuscript to the intended audience?
	How do you separate the jargon from necessary technical terms?
	How would you describe your views on language usage?
	Which reference books and dictionaries have you found most useful, and why?
	In previous jobs, how closely were you expected to review technical content and internal logic?
	In previous jobs, what sort of editing was expected for tables and figures?
Relationships with authors	In previous jobs, who reviewed your editing (supervisor, author, etc.)?
	How did you handle disagreements with the author over editing?
	What do you do when you encounter a manuscript with severe organizational and clarity problems?
Speed versus thoroughness	What kind of deadlines are you accustomed to working under?
	Do you prefer working under a tight deadline or under a more flexible schedule? Why?
	On a rush editing job, how do you decide which problems to fix and which ones to ignore?
Production skills	In previous jobs, what were your responsibilities for layout, design, and figure sizing?
	What kind of style instructions are you accustomed to providing with manuscripts?
	What kind of experience have you had working with graphic artists? Typesetters? Printers?
	In previous jobs, who did the proofreading? How do you feel about doing your own proofreading?
Miscellaneous	What sort of experience do you have with "on-line" editing using a computer or word processor?
	How do you feel about doing your editing on a screen rather than on paper?
	Are you accustomed to estimating the number of hours needed for a specific job?

Step 7: Rank the Interviewed Applicants

After the top several applicants have been interviewed, the final step is to systematically compare the available evidence of their abilities to the job qualifications prepared initially. The objective is to produce a ranked list of the interviewed applicants. If the interviews were well focused, you will have the information you need to make a sound hiring decision.

If you have difficulty deciding between two or more well-qualified applicants, a numerical scoring system may help you. Each applicant can be given a score for each job qualification. Combined with the weighting system for qualifications described earlier, these scores can be used to calculate an overall score for purposes of ranking. One way to calculate an overall score is to multiply the numerical score by the weight for each qualification, producing a "weighted score," and then to add all of these weighted scores to obtain a total weighted score for the applicant.

SUMMARY

Hiring an experienced technical editor can be expedited by first defining explicit job qualifications based on the editorial work to be done and then systematically comparing each applicant's abilities to these desired qualifications. Rigorous screening of resumes and careful preparation of focused interview questions will make the time spent on the hiring process most productive.

ACKNOWLEDGMENTS

Charles A. Malefyt and Mary W. Tisue, Argonne National Laboratory, provided valuable reviews of this paper. This work was supported by the U.S. Department of Energy under contract W-31-109-Eng-38.

Managerial Communication in College: Taught through Entrepreneurial Projects

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Previous ITCC Papers: "Role Playing a Writer/Editor Conference: Demonstrating the importance of Good Interpersonal Skills" (with Smith, Lay, Brady), 1983
"An Overview of Clarkson's Technical Communications Program," 1983
"Storyboarding and Writing," 1982

The Information Age makes strong demands on managerial communication, and, therefore, on teaching managerial communications. This paper describes a basic format for a course called "Introduction to Communications for Managers."

INTRODUCTION

The Technical Communications Department at Clarkson College agreed to develop a course specifically for Clarkson's School of Management students so that they would develop their communications skills. In the fall of 1983 the course went into effect with two of us, Dr. Herb Smith and I, each teaching two classes.

THE FOCUS

The Technical Communications Department Curriculum Committee listed three pages of goals that we should consider. The course, we decided, should survey the communication skills which we were teaching thoroughly in our 22 other technical communications courses since some of the management students would take only this one communications course while others would continue to pursue a concentration in technical communications. To accomplish teaching the skills that the Committee had selected and to integrate the students' assignments, we made the focus of the course center around group projects.

COURSE OUTLINE

After hearing introductory lectures explaining the structure of the course, each student brainstormed, listed and then selected products and services each was interested in developing. The students circulated and found others interested in developing projects similar to their own. Three groups of two and four groups of four students resulted. Two groups elected to develop services; the rest elected to develop products.

The advent of having computers for every incoming freshman at Clarkson provoked ideas. One group developed a service to store computers over holidays while another group decided to build lofts in the dorms (essentially partial second floors for sleeping) so that the students who invested in lofts would have more room. One computer for each student has added to the already cramped space in the dorms.

Other services included a cleaning service for dorm rooms, fraternity and sorority houses; a WROC radio station for students who like rock music; a car wash service. Other products included balloon-a-grams to celebrate festive occasions, to send to friends, to cheer shut-ins; a generator to replace the batteries in portable radios, to be powered by the bicycling listener.

After the students established their ideas, the initial lecture on organizational management became more relevant for them. They viewed organizational charts from companies and established an organizational chart to suit the development of their product or service. They defined the job description for each worker.

As their own group leaders emerged, information on the styles of leadership and management and the decision-making process held their interest.

With each written assignment the groups met to discuss aspects of audience analysis, necessary research, and appropriate formatting. Some of the written assignments included a sales letter, a news release, a policy statement, a procedures report, a memo proposal, and an annual report.

Some of the graphic illustration assignments included an advertisement, a brochure, visual aids for oral presentations, a letterhead, a cover for the annual report, a pie chart, and a bar graph.

Two main group oral presentations occurred: one midway through the semester and one at the end of the semester. The first concentrated on the organizational structure of the group and the policies established; the second concentrated on the promotional strategies and annual report. Throughout the semester the students helped with the instruction for these assignments by analyzing the available annual reports from other companies. They gave impromptu speeches or extemporaneous speeches on aspects of business information such as the layout of the annual report, the letter of transmittal from the president, the inductive and deductive reasoning and cause-and-effect analysis important in management decisions. They also discussed faulty reasoning based on ambiguity, generalities and hasty conclusions.

THE ADVANTAGES OF ENTREPRENEURIAL PROJECTS

1. The chief advantage is that the process of learning is enhanced. Students remain enthusiastic and eager to learn because they are directly involved in protecting their interests and in being helpful with their own group participants and competitive with students in other groups.

2. As well as generating interest, the entrepreneurial projects allow them to see how much time and energy successful communication takes. The division of labor, which they establish within their groups, allows them to see the strengths of others while at the same time it cuts down on the actual work each does. It simulates the actual business situation where everyone must work together but must understand how the input of others influences the work of each individual. The act of brainstorming becomes a very important element in their learning. In the process of producing a promotional campaign, in establishing the corresponding brochures and other publications such as the annual report, the students work among themselves to do an audience analysis, determining the educational level and technological expertise of their audience, how and where and why they will use the strategies necessary for their campaign and publications. They decide on the packaging. They work out the procedural scheduling, the ordering, the graphics, the type size, the influence that one decision has upon another.

3. A third advantage is that the students help each other learn. What some students hear in class, others do not. The entrepreneurial aspects help them want to pass information along to other members of their groups. They integrate the information that they learn in their other managerial classes, their finance and accounting classes.

4. The fourth advantage is that for a large portion of the semester the teacher can act as consultant and workshop leader rather than lecturer. Thus the students experience what it is like to work with a consultant who offers guidelines rather than with a teacher who provides rules.

5. Another advantage is that the course lends itself to teaching inductively; that is, when I do lecture, I show examples of written communications such as sales letters, news releases, brochures, and annual reports to the students and allow them to draw conclusions on what works and what doesn't work so that they then can write effective communications of their own. Again the observations of other group members help supplement their own observations.

6. A sixth advantage is one where I've looked to the future. The originality of the projects prevents computer-file reuse. The group members must have a unique project, and thus, must establish files of their own and learn to work out the particular problems that arise rather than making a few changes in a computer file and handing in an assignment established by someone else that year.

7. Finally, the students see the necessary overall organization and management. They comprehend the learning process as ongoing, one that they will continue to experience in their future careers, one where they will have to continue to be both student and teacher.

Quality Publications and Proposal Management

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This panel addresses managing three different aspects of technical communication: improving profit through effective communication, improving proposal preparation by distributing management responsibilities, and improving documentation through quality measurement.

The first speaker, Anthony H. Firman, President of Firman Technical Publications, Inc., discusses publications as a means of increasing sales and reducing costs. He proposes the theory that the most successful product is not necessarily the best product, but it is the best understood product. His topic, "Publications for Profit," also covers the relationship of an effective publication to a product's life cycle.

This presentation will help communication professionals in understanding how their work relates to marketing and to the financial growth of their companies.

Judith H. Marcus, Supervisor of Editorial Services for Martin Marietta Laboratories, looks at the roles of different functional groups in proposal preparation. Her presentation, "Proposal Management in a Small Organization—Everyone's Responsibility," focuses on the perspective gained by all contributors when they become aware of the scope of everyone's responsibilities. Management functions shared among marketing, technical, finance, editing, and secretarial organizations are discussed in detail.

A technical communicator working in a small organization will learn many valuable ideas and management approaches.

The third speaker's topic is "IBM's Information Quality Measurement Program." Dr. Naomi Kleid, Customer and Service Information, IBM Poughkeepsie, assesses her company's development and test program and how it is used to improve the quality of manuals and documentation. She discusses customer surveys of IBM manuals, the data derived from the surveys, the resultant measurement program, and the testing and validation of that program.

Documentation managers will find helpful ideas to apply to improving the quality of their publications.

IBM's Information Quality Measurement Program

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ABSTRACT

The IBM Corporation has developed a program to ensure the quality of its manuals. This program requires the information to be: accurate, readable, retrievable, and supportive of its readers' tasks.

A variety of procedures are used to control and measure information quality. These include: checklists, indicators, laboratory testing, and customer surveys.

This paper describes how the information quality measurement program was developed and tested. Examples of how this program is used to ensure information quality are also included.

INTRODUCTION

Within the IBM corporation, we have a set of internal guidelines that tell information developers what vocabularies to use; how to plan, organize, and write their information; and how to use graphics. We have standards for formatting and presenting information, and an extensive education program for writers, planners, editors, graphics artists, and managers.

We have a set of recommended procedures to ensure the accuracy of our information. These procedures include holding technical reviews of new and changed information; organizing formal inspections within the information development departments; having writers test their examples and procedures on new programs and equipment; and, in many cases, using testing laboratories to observe how people use our information, so that it can be presented more effectively, and specific problems can be identified and fixed before the manual is shipped.

In addition, we provide reader's comment forms in our manuals to solicit feedback from our customers. These comments receive a great deal of serious attention. They are tracked and counted; each one is answered personally.

Despite all these efforts at educating and guiding our writers, and verifying and controlling the books, we found that some of our manuals were receiving positive comments from readers and others were receiving negative comments. We had to develop a process that would let us know that we were consistently producing good publications.

We started by asking ourselves the questions: "How can we know that our information is good--that it's of high quality and meets our users' needs?" "How can we ensure the quality and usability of our information as it is being developed?" and, "How can we know that we are consistently producing better information for our customers?"

Answers to these questions emerged during three years of studies and verification efforts.

These activities led to the creation of a comprehensive program to ensure the quality and usability of our information (1). This program is undergoing continual verification and modification as our information changes and as we learn more about how our customers use this information. However, this program is now in place in a number of IBM locations, world wide. We're excited about it, and we'd like to share it and the story of its development with you.

DEVELOPING THE PROGRAM

Survey

In 1980, we surveyed more than 500 customers to determine their satisfaction with their manuals. That survey produced recommendations about how to improve our manuals. It also produced data about the kinds of factors that affect users' perceptions of information quality and usability; and it convinced us of the value of doing customer surveys.

For example, we found that customers did not like the Technical Newsletters (TNLs) that we provide as updates to manuals. Some customers didn't incorporate the TNLs into their manuals. These findings led us to change our practices. Now, TNLs are only used in emergency update situations, and most new customers receive manuals that already incorporate the updated pages. Consequently, the time customers spend updating their manuals is reduced, and they can begin to use our information and products much more quickly.

Four Key Factors

The 1980 survey gave us some other useful data. It showed that four factors affect customers' satisfaction with our information and their perceptions of its quality and usability. These factors are: accuracy, retrievability, readability, and something we call "task-supportiveness."

On the simplest level, when we say that information is accurate, we mean that it is free of errors. But errors can be caused by many things. The information can be wrong, or it can be missing, misplaced, or ambiguous. All of these affect accuracy.

The manual's ability to identify itself to its users and help them find specific items of information, is its retrievability. Obviously, retrievability is important, because information can't communicate unless its users can find it.

When the information is found, it must be readable. Readability depends not only on things that affect the eye (like format and layout), but also on things that affect the mind (like organization, style, vocabulary, reading grade level, and pacing).

Finally, "task-supportiveness" means the manual's ability to help its users do productive work; procedures and examples relate to task-supportiveness.

These four factors have become the cornerstones of our quality measurement program. That they came out of our original survey helped convince us of the value of doing surveys.

Other things about that survey also proved helpful. For example, applying a common practice from attitude and market research, we used a Likert scale that asked customers to give many of their answers in terms of numbers from one to five (2). With these responses, we were able to perform a variety of statistical analyses to compare manuals' strengths and weaknesses, and to identify very "good" and very "bad" books. We also asked customers to give us reasons for their evaluations, and we provided some opportunities for them to answer general questions. (It was through these open-ended comments that we learned about the dissatisfaction with TNLs.)

The statistical analysis possibilities and the general comments convinced us of the value of doing surveys. They have become one of the on-going elements of our information quality measurement program.

Checklist

Once we learned that accuracy, retrievability, readability, and task-supportiveness were important to information quality and usability, we looked for ways to improve our manuals in these respects.

Many of the things we were already doing went into a Corporate-wide process checklist for writers to follow when they are developing their information. This checklist recommends that writers use the guidelines, standards, and procedures described in the Introduction.

The checklist has also become part of our information quality measurement program. But its limitations are that it is basically nonquantifiable (beyond counting the number of items adhered to and the number omitted) and its most appropriate focus is on accuracy.

Information-Based Factors: Indicators

We next looked for ways to quantify and ensure the retrievability, readability, and task-supportiveness of the information as it is being developed. In 1981, we spent several months analyzing all of the manuals that had been in our customer survey. Responses to the evaluation questions had already told us which manuals customers considered good or bad; but we wanted to know more about each one.

Each manual was scrutinized carefully. We counted 72 different factors in each book. For example, we counted the number of headings on each page, the number of acronyms and technical terms, and the numbers of examples, illustrations, and tables. Then we used statistical t-test and analysis of variance procedures (3) to see if any of these factors differed significantly for books that customers said were "good" and "bad." For example, we found that the good books had fewer acronyms, more tables and examples, and lower reading grade levels (4).

These findings, plus our own observations and customer comments, helped us narrow down the number of factors. Now, we are continuing to work with 35 information-based factors, and we call them "indicators" because they've been found to provide early indications of whether or not our customers are going to find the books retrievable, readable, and task-supportive.

Indicators have become another element of our quality measurement program. We use them as planning guides and as an early warning system that identifies problem areas, which a writer can fix before the draft is complete. To aid planning, we developed ranges for the indicators based on our guidelines, standards, and counts we've obtained from books that customers say are "good." Writers use these ranges as measurable objectives while they develop and check their own drafts. Indicator counting (and comparing the actual, obtained counts against the recommended ranges) is treated as an exercise in reason. Writers think about what it means to have these objectives to aim for, and what it might mean if they don't reach any one objective for their book. Thus, the writers get immediate, measured feedback on their drafts as they are developing them, and they retain control over the objectives that they commit to

Laboratory Testing

At the same time we were studying the information-based factors, we were also looking for ways to use testing laboratories to verify the accuracy, retrievability, readability, and task-supportiveness of our information. We also wanted to measure our users' productivity as they worked with our manuals. We specifically did not want to focus on their productivity with our equipment or programs. Other functions were already doing this product testing and assurance work. Instead, we wanted to focus on the information and those aspects of the information over which we had responsibility and control. We again looked for ways to measure our four cornerstone factors.

Our laboratory testing measures are these: the time it takes to find and set-up the information (which is a measure of retrievability); the time it takes to read the information (which is a measure of readability); the time it takes to use the information to do a specified task (which is a measure of task-supportiveness); and the errors our users make while working with the information (which is a measure of accuracy) Errors are categorized four ways: those due to missing, misplaced, ambiguous, or incorrect information.

These time and error measures were tested in 1982. During that verification effort we not only learned about our lab testing measures and procedures, but we also learned a lot about ourselves.

As testers, we found it difficult to watch someone make mistakes and not offer assistance. We wanted to help the people we observed having problems, and we had to learn to wait patiently until they actually asked for help. If we helped too much or too soon, we wouldn't learn what was wrong with our information or how to do it better next time.

During debriefing sessions, we became interviewers. We had to learn to ask nondirective questions about what our users had done, and we had to let them describe their experiences from their own, sometimes muddled, perspectives. By learning how our readers thought about their tasks and our manuals, we could design better systems in the future.

We also had to learn how to manage our guest observers, who were very concerned, technically competent IBMers who came to watch our testing. Often, these guests needed gentle crash courses in how to quietly "let the user be."

In terms of our lab testing procedures, we discovered the importance of validating our descriptions of the tasks and users that would be employed in the information tests. In one case, a series of tests was invalidated because the task we asked the users to perform contained ambiguous words. Some people did the task we intended, but other people did something else, which was reasonable considering the wording we had used. In another case, a series of tests was nearly cancelled because we had trouble describing the types of users we required.

Learning to be testers, test planners, test-lab managers, and interviewers wasn't easy, but it was worth it. We found that our time and error measures would help us improve our information. These measures permit us to compare similar manuals and set measurable objectives for new manuals, so that we continue to improve our users' productivity.

Another benefit of laboratory testing is that it helps us identify and fix errors before the product and the manuals are shipped. This type of testing--known as observational testing--is not strictly related to the time and errors measures. In many IBM locations, observational testing is being done before the measurement tests.

Testers within the IBM Corporation have been using observational testing for many years. (See articles from IBM Endicott, Kingston, Raleigh and others in this and last year's ITCC Proceedings.) During observational testing, we watch how people (who are like our intended readers) actually use our information and products. We've had some eye-opening experiences that challenged our basic assumptions.

We've seen reasonable people destroy diskettes on which programs were shipped because they had never seen diskettes before and we didn't clearly explain how they were packaged. We've seen ingenious people create their own, incorrect procedures because they couldn't see reference diagrams that had become obscured by moveable parts of their machine. We've seen hard-working people become completely stopped by unnecessarily complicated procedures that could easily be redesigned. In every case, the information and product developers observing these problems have come away determined to make things easier for their customers.

Our laboratory testing procedures now recommend that software and hardware developers attend the lab tests run by the information developers. These procedures also describe ways to test the quality of the information, rather than the qualities of the user. We're still improving these procedures, but we're convinced that laboratory testing of information is a cost-effective element of our total information quality measurement program.

In one case, all the costs associated with establishing and using a testing laboratory were recuperated by avoiding the reprinting of pages that contained problems identified in that lab. These costs are not small; labs have one-way mirrors, special soundproofing, expensive cameras, microphones, and recording equipment. Their use requires at least two trained observers; planning, analysis, and reporting time; and paid test subjects.

But the costs of printing large quantities of manuals is even higher than the laboratory costs. Considering the added benefits associated with increasing our customers' satisfaction and productivity (so that they will be able to use our products faster and more fully), and improving our understanding of how our products and information can be designed even better in the future, we've concluded that laboratory testing of manuals actually results in substantial financial benefits to the IBM Corporation.

USING THE PROGRAM

Having verified each part of our information quality measurement program, we decided in 1983 to test the combined program. The program was presented to representatives from all IBM divisions. Several representatives volunteered to participate, and one division was selected because it included a variety of locations.

Individuals at these locations received education and assistance from a full-time technical consultant for seven months. During that time, we counted indicators, did lab testing, conducted customer surveys, analyzed data, evaluated the program, and reported back to top management.

The data showed that by testing each manual in three different ways--by counting its indicators, by measuring its performance in a lab, and by surveying its readers--we could obtain additional interaction benefits.

For example, the surveying not only gave us feedback on our manuals' quality in the field, but it also helped us know who our actual users were. In one case, we found that our actual users were different from those we expected. Consequently, the objectives for that manual's indicators needed to be changed. (We could write a shorter manual at a higher reading grade level using more tables and listings.) We also found that the laboratory testing should use a different type of reader. The next release of this manual will be more effective than the current manual, and it will be produced more efficiently and cost-effectively. Follow-on surveys will help us keep track of this manual's market, and they'll help us continue to adjust this information as the market place and users change.

In all cases, the findings from the surveying, lab testing, and indicator counting were seen to be cross-related. Using the cross-related findings, we could plan more effective information; help writers establish more specific, measurable objectives for their drafts; improve the "reality" of our lab testing; and modify the customer feedback techniques to include not only surveys but also customer visits.

Our overall recommendation was that the program was effective and should be expanded to more locations. That recommendation was supported by top management.

CONCLUSION

This information quality program is being used by many locations throughout the IBM Corporation. We have an internal guideline of procedures. We have working groups that meet periodically to share experiences and educate new members, and a central coordinator and consultant. We also have a data base from which we analyze all the data, refine the measurable objectives for indicators and lab testing, improve our writers' checklist, and evaluate the information quality process.

We believe that as we continue to apply this process, our customers will find more and more of our manuals easier to use.

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Publications for Profit

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Every employee makes a contribution to the profitability of the company. When the company manufactures industrial equipment, communication with the marketplace is a key factor in the company's profitability; a major part of this communication takes place through marketing and support publications.

This paper helps publications professionals understand how their work fits into the overall function of marketing, and how it contributes to the company's success. It may also be helpful to them in "selling" their services to marketing and other executives who are not fully aware of the importance of publications. The paper analyzes the impact of technical publications for both marketing and supporting products during the four major phases in a product's life-cycle.

PUBLICATIONS AND PROFIT

Profit is defined by one simple equation:

Profit = sales - costs

Thus there are two approaches to improving profits:

a) increase sales, and

b) reduce costs.

Certainly a wise manager's primary responsibility is to increase sales. But a manager is also wise to reduce costs as much as possible, as long as it is not at the expense of sales.

Effective communication with the marketplace undoubtedly helps sales. The use of well prepared technical publications can significantly reduce the cost of this communication.

PUBLICATIONS AS A MEANS OF INCREASING SALES

We have all heard that "a good product sells itself". While this may not be exactly true, it makes a point: it is certainly easier to sell a good product than a bad one. Or, to put it in still more realistic terms, it is easier to sell an apparently good product than a questionable one. Some people say that the most successful product is not the best product, it is the best understood product.

For this reason it is vital to understand that buyers and users see the publications that promote and support a product as a part of that product. Good publications turn any product into a well understood product. For example:

- If a sales brochure looks complete, tidy, and well thought out, a potential customer is likely to assume that the product was designed in the same way. On the other hand, if the brochure is incomplete and untidy, and generally looks as if it were put together in a hurry, a potential customer is likely to assume that the product was designed in the same way - in a hurry, with a lack of attention to detail.
- If a price list is complete and accurate, the customer learns to trust it, and to trust the products behind it. On the other hand, if a price list fails to include certain key options or accessories, the customer may wonder if they really exist.
- Similarly, if a manual is complete and well organized, the user learns to trust it and the product. However, if a manual omits important details, or is badly organized, the user is likely to wonder if the product itself also leaves something to be desired. In fact, if the manual is so bad that the user cannot use the product effectively, then the product very definitely does leave something to be desired - namely, information.

Today's markets are very competetive. Your customers and potential customers don't have to go far to find other vendors. Only a very foolish person would give a customer any reason for turning to the competition.

PUBLICATIONS AS A MEANS OF REDUCING COSTS

From the cost point of view, too, effective publications are attractive. The fact is, all forms of communication cost money. Your goal is to maximize profits by reducing costs without reducing sales. This means that you want to find a method of communication that is ideally both more effective and less costly than the alternatives.

Communication is a pervasive thing: it occurs all the time, without us realizing it. As a result, sometimes the cost of a communication is hidden; and sometimes that hidden cost is surprisingly high. The cost of preparing effective publications is hard to hide. Yet in fact, it may be substantially lower than the cost of the alternative, but hidden, methods of communication. For example:

- If a sales brochure is complete and accurate, your sales representatives have an easy job in qualifying leads and closing sales. On the other hand, if a brochure is incomplete or misleading, your sales representatives may have to make extra trips to clarify details, or a potential customer may need an extra demonstration of the product. These costs are hidden in sales overhead. They do, however, show up as reduced sales per representative - or as a need for more sales staff to maintain the level of sales.

- Similarly, if a manual is complete and effective users can operate and maintain the equipment effectively for years without needing any extra help. However, if a manual is incomplete or ineffective, users call your technical staff for help. Your designers may spend hours on the telephone helping customers. Sometimes they may even make trips into the field to help with very difficult cases. These costs are hidden in engineering overhead. They do, however, eventually show up as reduced efficiency in the engineering department - as a reduced number of new products being brought to market.

Today's costs are very high, and generally rising. You don't need to drive them up any higher than you have to. Professor James W. Hill - currently of The Pennsylvania State University, and before that a technical communicator and manager at several major manufacturing and research companies - states that "One technical writer can save 10% of the time of each of 50 engineers, and the addition of trained and integrated support services from a central publications group with appropriate automated equipment can easily save much more on the staff side."

PUBLICATIONS AND THE PRODUCT'S LIFE-CYCLE

The life of a product in the marketplace is often illustrated by a sales curve like the one illustrated in Figure 1. The "S-shaped" sales curve is typical, and is commonly divided into the four stages shown:

- Introduction, a period of relatively slow growth during which income pays off (or at least begins to pay off) the development of the product.

- Growth, a period of more rapid growth and increasing profitability.

- Maturity, a period of more or less stable sales and profitability.

- Decline, a period of declining sales and profitability, caused by the obsolescence of the product, which ends when the product is taken off the market.

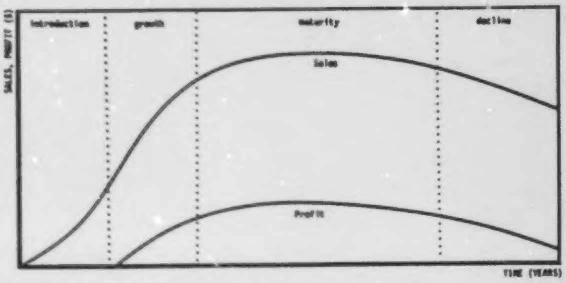

Figure 1. The life-cycle sales, costs, and profits of an industrial product.

Occasionally there are variations in this curve. Sometimes a product fills a specialized market niche, and goes on indefinitely at a low level of sales; this has been referred to as "petrification". Sometimes the S-shaped curve is repeated - usually at a lower level, but occasionally at a higher level - as a new market is found for an older product; in this case the second cycle is referred to as a "recycle". And sometimes a product remains in use in the marketplace, and continues to require support, long after the vendor has stopped selling it.

Effective communication plays a part in all stages of a product's life, including re-cycling. As a cost-effective communication tool, publications can have a significant impact, as described below.

The Introduction Stage

The introduction stage is very critical to the continuing success of a product. First, it must establish the product in the marketplace as a viable product. And second, it must accelerate sales as rapidly as possible so that the product can become profitable as soon as possible. Money is very expensive these days, and paying back the investment in developing the product is a critical part of a company's financial success. Furthermore, the sooner profits are realized, the sooner the company can begin developing more new products - the key to corporate survival and growth.

The marketplace initially finds out about a new product via advertising and promotion. Having heard that a new product is available that might be useful, a prospective customer first wants more information. But the form of this information is critical: not all forms are equally satisfactory.

Consider the case of a vendor sending a sales representative to make an immediate visit to a potential customer. A sales representative, by expressing excitement about the product, can convey that excitement to the prospect. Prospects are often very enthusiastic about a product right after the sales representative leaves. But this enthusiasm has a way of evaporating, and unless the sales representative can close the sale during the visit, there may be little long-lasting effect.

Furthermore, the prospect may in turn have to sell his/her management on the product - and may not have asked all the questions that management asks. The result may be a continued round of sales visits, questions, and answers, at continually higher levels until:

- someone discovers that the product is not the ideal solution for the problem at hand, or
- everyone loses interest because the process is costing more than the solution is worth, or (in a small number of cases)
- the sale is made.

Whatever happens, there is usually considerable expense for all parties. Consider that the average sales call in 1983 cost close to $200, and that it may take hundreds of initial calls to find a prospect who eventually turns into an actual customer.

Now consider the case of a vendor sending some appropriate literature to the prospect. This literature may include one or more brochures, a catalog, and/or a price list; it might include reprints of technical articles about the product, or reviews of the product from the trade press; and it might even include some technical literature, such as a user's manual that shows how easy the product is to use. While this literature cannot generate the instant enthusiasm of a sales representative, it can answer a great many questions. And it can be circulated in the prospect's company to answer many questions very quickly at all levels. The major advantage to this approach is that it reduces costs. Since the vast majority of enquiries do not result in sales, the fact that a package of literature can typically be sent for less than $10 makes it much more attractive than sending a sales representative for $200.

The Growth Stage

During the growth stage you find out how strong a root system the product put down during the introduction stage. If the product took strongly, the growth is both rapid and prolonged. If the product did not take well, growth may peter out, leaving a product with very little profitability.

During the growth stage the reputation of the product and the vendor are important. If the vendor is already well known as a producer of quality products, and as a company that supports its products well, then the battle is half won. This vender needs only to show that the new product lives up to the reputation of its forbears, and that the company continues to support its products.

Publications can be a key factor in establishing the reputation of a company. At the beginning of this chapter I pointed out that "publications are a part of the product". A company that provides good products and good publications earns a good record. A company that provides good products but bad (or no) publication earns a questionable, or even negative, record. Furthermore, an abundance of publications bearing the company name keeps that name in the public eye.

Providing plenty of good publications, and providing a continuous stream of new publications in the form of application reports, updated manuals, and so on, earns a company the reputation of supporting its products well in the field. There are other ways to support products - such as visits from applications engineers and in-plant seminars - but they all cost much more than publications. These alternatives may also be less useful in the long run, because their effect is short-lived, and because the customers' staff that are exposed to them turn over frequently. A publication has the advantage of being continually visible, and always available when needed.

The Maturity Stage

During a product's maturity stage its sales and profitability stabilize. Sales are based on the vendor's continuing reputation for selling quality products and providing quality support. During this phase the vendor often introduces both product enhancements and optional accessories. Both of these need to be accompanied by effective communication, both for sales and for support. The constant flow of publications also keeps the company's name and reputation in full view.

The Decline Stage

As a product becomes obsolescent, support can become even more critical. Older products often need more support: they break down more often, and they may seem less convenient to use than newer products. Furthermore, the original users may have moved on, leaving the product to be supported by newer, usually less experienced people.

At the same time, the vendor may no longer have experts in these products available: they have forgotten the older products, or they may even have left the company altogether.

Thus there is now a double problem: the need for more frequent support at the user's end, combined with a shortage of skilled staff at the vendor's end. When you consider that at this point the product has been on the market for many years, and there may be a great many of them in use world-wide, you may have a considerable support problem.

It is at this stage that effective support publications can save a vendor's reputation. Older products can continue to give good service if they are well understood. Indeed, it is not uncommon for products that have become obsolete in their original application to find totally new applications. A product that was far too expensive for a particular application when new may become a very attractive bargain after it has been depreciated in a more exotic application. Nevertheless, to succeed in such a new application a product must be well understood. And for an old product, such understanding may only come through the existence of effective publications.

CONCLUSIONS

A company's profit depends on keeping sales up and costs down. Effective communication with the marketplace can be an important factor in keeping sales up. Using of effective technical publications can significantly reduce the cost of this communication. To put it simply:

> Good publications are good for profits!

This paper is based on a textbook provisionally entitled "Technical Publications Management" that was in preparation at the time these Proceedings went to press.

Proposal Management in a Small Organization—Everyone's Responsibility

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ABSTRACT

Proposal management must be suited to the size and type of the organization. Small companies cannot afford to maintain a group devoted solely to proposal preparation, but they must have a method in place for producing proposals efficiently and effectively.

The method used at Martin Marietta Laboratories distributes proposal management responsibilities among five functional groups; marketing, technical, secretarial, editing, and finance. The tasks of each are defined at strategy and scheduling meetings, and specified on a routing sheet that accompanies the proposal as it is passed around for each group's inputs. The routing sheet gives each contributor a sense of responsibility for the quality and timeliness of his or her input.

INTRODUCTION

Even though Martin Marietta Laboratories is a division of a large corporation, a significant part of our budget comes from contracts with government and industry. With only about 270 employees, we must apply proposal production procedures that are appropriate to a small organization. Specifically, we cannot maintain a group devoted solely to proposal preparation, but, when the occasion demands, we must be able to complete a proposal efficiently and effectively.

Proposal management at the Labs over the years has reflected the direction of research, the interests and size of the staff, and the grant funds available. When the Labs was founded in 1955, staff were few, basic research in almost any area was encouraged, and government funding was generous. A research proposal was generally produced by one scientist, who developed the idea, identified a likely source of support, wrote the proposal, and prepared and delivered it with the help of a single secretary.

As the Labs has grown and changed, so has the nature of our proposal efforts. Three types of changes have taken place. First, research at the Labs has been channeled into areas related to the business of Martin Marietta Corporation, i.e., aerospace hardware and systems, aluminum refining and fabrication, basic construction materials and related products, biosciences, and data base management. Second, research programs are joint efforts, crossing departmental and disciplinary lines. And last, scientists are faced with much greater competition for funding and many more funding agencies than was true 25 years ago.

The ramifications of these changes for proposal development and management at the Labs have been significant. Research ideas must be weighed for their relevance to the Corporation; no one works in isolation — all the resources of the Labs, both equipment and personnel, must be considered in planning research; one scientist can no longer personally monitor all contract opportunities in his or her field.

These considerations led to the formal establishment of a Marketing Department at the Labs about 10 years ago. At present, the functions of this group are to develop intelligence about contract opportunities at outside organizations, match them with the qualifications and interests of the technical staff, and work with the technical staff to plan proposals in the areas identified. Some of our proposals may be prepared in response to a Request for Proposal (RFP), but most are unsolicited, i.e., they are written at the request of a contract officer in an agency interested in a particular line of research.

However, planning the content or thrust of a proposal is not the same as managing it. The final document must contain, in addition to the technical portion, sections on personnel qualifications, facilities descriptions, program management, costs, and various required representations. In addition, it must be well written and consistent in style and must meet agency format requirements. Editors, illustrators, finance personnel, technical management, and secretarial staff all have inputs that must be coordinated and incorporated at the proper stage of the proposal cycle.

During the past several years, various schemes have been tried at the Labs for managing proposal production. The principal investigators (PI) were at one time designated as proposal managers, but most were unable to set and meet a reasonable schedule for the various steps. They would underestimate the time needed to prepare each part, and, then, in a misguided effort to save time, would try to combine two or more steps, for example, editing and management review.

Similarly, neither the assigned editor nor secretary alone was effective in managing the proposal. They had to spend a great deal of time verifying the status of each part, and had little influence in persuading the various contributors to complete their sections on time.

NEW PROPOSAL COORDINATOR METHOD

The scheme that has proven most effective is one where management responsibilities are shared by all groups involved — marketing, technical, finance, editing, and secretarial, with a Proposal Coordinator to monitor progress. Table 1 shows the interaction of the various departments in each step of proposal production.

After the proposal topic and potential sponsor have been identified, strategy meetings are held among marketing, technical, and editorial personnel to discuss the thrust and tone of the proposal, as well as the agency requirements. Then, finance and secretarial staff join in scheduling the various inputs to meet the proposed deadline. A proposal budget is approved, and the proposed Principal Investigator(s) (PI) writes a first draft of the proposal, prepares roughs of illustrations, and selects the appropriate resumes and facilities descriptions from the archives.

At this point, the PI affixes a routing sheet (Figure 1), supplied by the Proposal Coordinator, to the proposal and makes the appropriate entries. Budget data do not travel with the proposal; they are worked up separately parallel with the writing of the first draft. However, budget progress is noted on the routing sheet by the Proposal Coordinator.

The proposal is then routed in turn to the department secretary and back to the author as many times as is necessary to produce an acceptable draft. It then goes to technical management and marketing for review. The designated person in each group signs off on the routing sheet to indicate that proper action has been taken. Only at this point is the proposal submitted for editing. Usually, most problems have been identified and solved in the review process, and the editor can concentrate on language, style, and format rather than the suitability of the technical approach.

After final technical review, the proposal is put into final form, proofread, and approved by management, marketing, and finance. Cost data are then attached, and the document is reproduced and distributed.

RESULTS AND DISCUSSION

The method has been in effect for two months and has been applied to several proposals. Although there are inevitable glitches, the production process has gone smoothly. One reason is the willingness of those involved to demonstrate flexibility by sharing responsibilities if necessary. For example, editors will often type captions on illustrations to save time, and PI's will help out with photocopying and birding.

The chief reason for the success of this method is the integrating effect of the routing sheet. Since the sheet lists all the activities necessary to produce the proposal, it puts each person's input into perspective from the point of view of both time and effort. For instance, PI's can see from the sheet that they are responsible not only for the first draft but also for the budget and the second and third drafts. Consequently, they tend to manage their time better, or at least have only themselves to blame if their parts are late. Further, the routing sheet reinforces each contributor's sense of responsibility for his or her input. When a person must initial the sheet to indicate completion of a task, he or she will want to make sure it's been done well and on time.

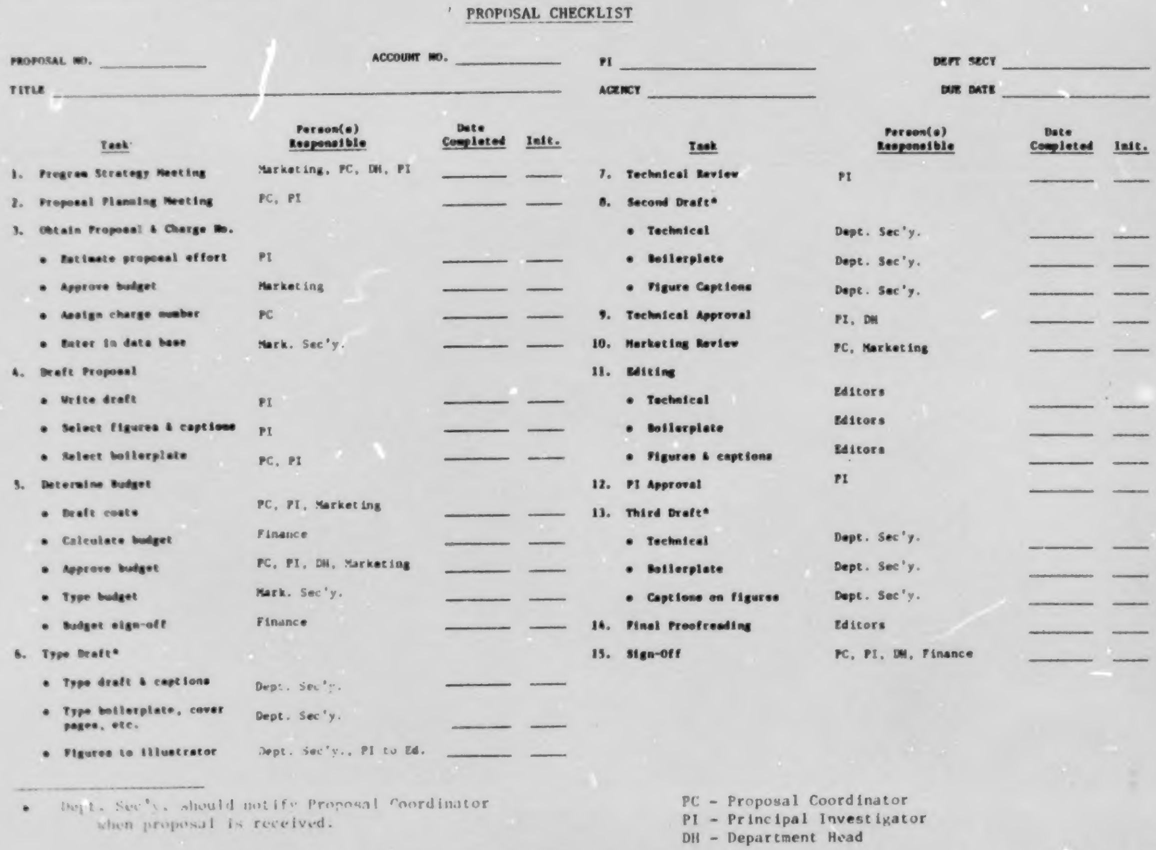
Based on our experience to date, this method appears to lead to effective and efficient proposal preparation with a minimum of frustration.

Table 1

Division of Responsibilities for Proposal Management

Functional Group	Strategy	Schedule	Budget	Generation	Review	Modifications	Second Review	Modifications	Editing	Final Review	Final Modifications	Reproduction	Distribution
Marketing	x	x	x	(a)			x			x		(b)	x
Technical	x	x	x	x	x		x			(c)		(b)	
Secretarial		x		x		x		x			x	x	
Editorial (includes illustration)	(b)	x							x		x	(b)	
Finance		x	x										

(a) Cost data only
(b) Participates if necessary
(c) Technical management



PROPOSAL CHECKLIST

PROPOSAL NO. ____________ ACCOUNT NO. ____________ PI ____________________ DEPT SECY ________________

TITLE ____ AGENCY ____________________ DUE DATE ________________

Task	Person(s) Responsible	Date Completed	Init.
1. Program Strategy Meeting	Marketing, PC, DH, PI	______	____
2. Proposal Planning Meeting	PC, PI	______	____
3. Obtain Proposal & Charge No.			
• Estimate proposal effort	PI	______	____
• Approve budget	Marketing	______	____
• Assign charge number	PC	______	____
• Enter in data base	Mark. Sec'y.	______	____
4. Draft Proposal			
• Write draft	PI	______	____
• Select figures & captions	PI	______	____
• Select boilerplate	PC, PI	______	____
5. Determine Budget			
• Draft costs	PC, PI, Marketing	______	____
• Calculate budget	Finance	______	____
• Approve budget	PC, PI, DH, Marketing	______	____
• Type budget	Mark. Sec'y.	______	____
• Budget sign-off	Finance	______	____
6. Type Draft*			
• Type draft & captions	Dept. Sec'y.	______	____
• Type boilerplate, cover pages, etc.	Dept. Sec'y.	______	____
• Figures to illustrator	Dept. Sec'y., PI to Ed.	______	____

Task	Person(s) Responsible	Date Completed	Init.
7. Technical Review	PI	______	____
8. Second Draft*			
• Technical	Dept. Sec'y.	______	____
• Boilerplate	Dept. Sec'y.	______	____
• Figure Captions	Dept. Sec'y.	______	____
9. Technical Approval	PI, DH	______	____
10. Marketing Review	PC, Marketing	______	____
11. Editing			
• Technical	Editors	______	____
• Boilerplate	Editors	______	____
• Figures & captions	Editors	______	____
12. PI Approval	PI	______	____
13. Third Draft*			
• Technical	Dept. Sec'y.	______	____
• Boilerplate	Dept. Sec'y.	______	____
• Captions on figures	Dept. Sec'y.	______	____
14. Final Proofreading	Editors	______	____
15. Sign-Off	PC, PI, DH, Finance	______	____

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* Dept. Sec'y. should notify Proposal Coordinator when proposal is received.

PC - Proposal Coordinator
PI - Principal Investigator
DH - Department Head

Figure 1. Proposal routing sheet

Stress Management for Technical Communicators

Judith Gunn Bronson and Victor A. Gunn

Is your boss driving you bonkers? Does your VDT give you the DT's? Do you want to erase your editor (with a laser)? Or blue-pencil your writers (right through the heart)? Then come to our workshop!

Stress Management for Technical Communicators has become an annual tradition. It provides the latest views on what stress is and guides participants in locating their own sources of the obnoxious stuff.

The workshop leaders then present various techniques—some quick fixes, some requiring more work—for dealing with stress on the job. There is time for questions and comments from the audience, and a supply of stress dots.

Audience Analysis and Response

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WHAT THIS WORKSHOP IS ABOUT

A great deal of confusion exists about the audiences for technical documentation. In general, the assumptions that a publisher of technical documentation makes about an audience err in one of two directions: assuming too much knowledge on the part of the audience, or assuming too little. Errors in either direction can adversely affect audience (consumer) satisfaction with the product.

As equipment becomes increasingly complex - and audiences often become increasingly naive - the problem of analysis becomes more critical: Just how much does the audience already know? How much should the audience know to make best use of the product? What help is available to the audience in using the product? How can a lack of basic skills be overcome? How much must we teach the audience about this class of products in general before we can teach them about our specific product?

This workshop focuses on the problems of how to analyze an audience, and how to use the findings, including direct analysis and the use of notes and experience from the people who work directly with the audience. Included in the analysis section will be a discussion of:

- the sample to be used in an analysis
- developing questionnaires
- follow-up interviews
- correlating results

The only legitimate reason for conducting an audience analysis is to use the results in responding to an audience. Thus, this workshop will also present the ways in which an audience analysis should result in a response tailored to the audience just analyzed and no other.

Responding to an audience is not always easy. The two main obstacles to response are corporate policy and disrespect for an audience that has been analyzed. Thus, any response to an audience must be tempered by marketing, sales, engineering, and political considerations of the company, agency, or department making the response. The response should show a respect for the audience - their need to perform satisfactorily and their need to understand the product.

Finally, this workshop will show how to use each element of the analysis in shaping a precise response. We will bring together what we know about the audience and the workspace into a coherent method of responding point by point to the audience.

WHO SHOULD ATTEND THIS WORKSHOP

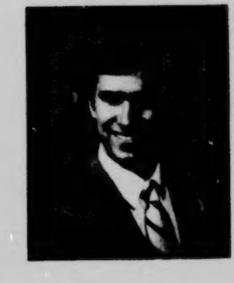
This workshop is aimed at technical writers, editors, and illustrators - that is, anyone who is concerned with communicating complex information effectively.

THE STRUCTURE OF THE WORKSHOP

The workshop will essentially be an open discussion group for debating these questions and the possible responses for several different types of technical publication.

Planning for the Disaster Not to Happen

Richard E. Wiegand, Moderator



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The inevitable always happens! Or, put another way, nothing ever comes out as planned!

Preparing for the inevitable takes patience and time, but when it happens (and it will) managers are glad to have planned for it! This panel provides three perspectives of such planning, drawing on experiences from three different experiences. Each perspective provides practical solutions to keeping disasters from happening. But when they do, the experiences shared in this panel may help managers cope with a disaster, or how to prevent such disasters from happening.

David Posner emphasizes the dependence we have on data processing based information systems - and the necessity for developing procedures to recover from natural or man-made disasters and component failures. He covers the details often overlooked in such planning that minimize the effects of such disasters and maximize the safeguarding of vital assets. The timely restoration of an operational site must also be planned to minimize any disruption. Poor planning in this area could literally put a company out of business.

Such detailed planning becomes more important to technical communication managers who install personal computers, link their departments to company data networks, or produce publications by using word processing equipment. Relying on a company's data processing/management information systems department to prepare such plans may not provide enough detail for a technical communication manager.

Jill Patton links disaster planning with the loss of market share for "pop technology" products. As more products reach the "new technology consumer," software documentation produced on paper is not enough - users want easy access to software through terminals. Joining a programmer/analyst with a writer/educator to produce user documentation that is targeted for this new consumer can enhance the marketability for the product.

A disaster here can be averted if the publications department gains clout and credibility (i.e. support) from management and from the technical staff. Ms. Patton addresses ways this can be done, drawing on recent experiences she's had in her company. Adding to a company's bottom line keeps a disaster from happening, but gaining credibility and clout comes from communicating how a publications department aids to profitability and helps avoid a marketing disaster.

Jeff Hibbard focuses on planning from a more traditional management perspective, drawing on his experience in managing a corporate technical publications department that produces three publications for a large company. He further highlights some common disasters that creep into the planning process, and that can cause a manager trauma.

Establishing a personnel management philosophy and a planning process based upon a company's needs are covered, emphasizing that these are critical to avoiding disasters. Such planning controls costs, keeps budgets in line, maintains schedules, and lessens the chance that equipment outages will affect the operation. Using suppliers and outside vendors (especially in lieu of in-house services) require a special emphasis to identify the best ones available, to qualify and quantify requirements placed on them, to seek competitive bids, and to track performance. Traditional planning sometimes negates the need for special plans to recover from such disasters.

The Quest for Clout and Credibility: How a Publishing Group can Survive in a High-tech Environment

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The Level of User Knowledge

The credibility of the publication function in a high-tech industry is often linked with the level of product technology. If the end-user is not highly-trained, then the educational aspect of the documentation is seen as a valuable part of the product. It becomes a quantifiable aspect of product marketability.

If the end-user is a highly-skilled engineer, the role of the documentation department is at best superfluous and spurious. The integrity of the technology at the machine or hardware level is far more important than the documentation of the technology. A skilled engineer can directly access the technology and often prefers to do so.

Technology explosions bring an explosion of audience. Non-technical people find themselves in need of technology. Like the trained engineer, the neo-engineer also wishes to directly access the technology. The consumer of new technology does not enter a computer store to read the user's manual for a piece of hardware or software. The neo-engineer wants immediate, palatable access. The educator/writer now joins the programmer/analyst to empower the user at his own level with full access to technology.

With this coupling of educator/writer and programmer/analyst comes the quest for clout and credibility. On an archetypal level, art clashes with science. On a practical level, the manuscript must reflect the program/hardware, be palatable and comprehensible to the user, and be produced quickly enough to be current with the technology. This paper explores the issues raised by the juxtaposition of these opposing disciplines and offers suggestions for framing the work and issues for maximum productivity.

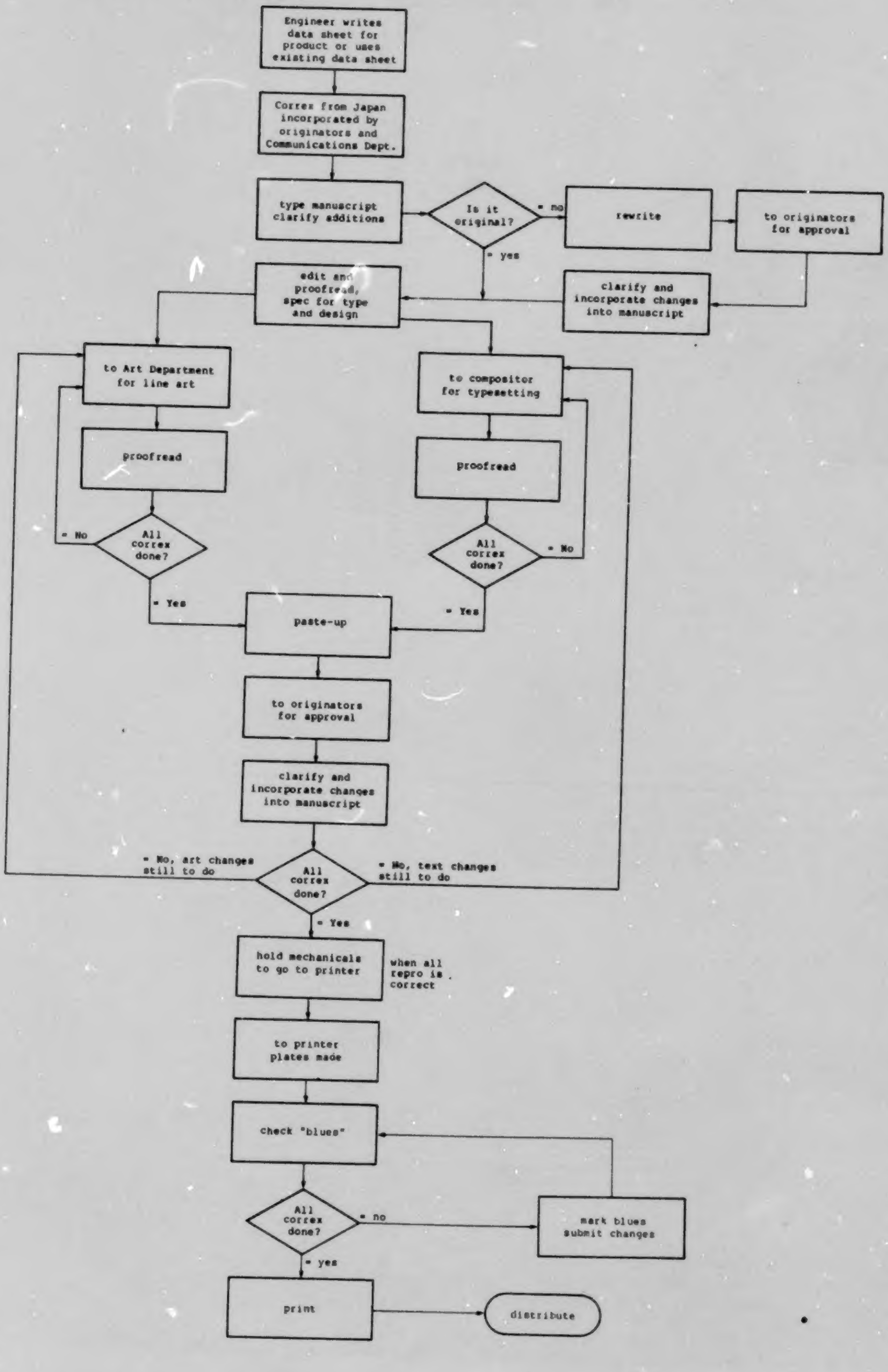
Corporate History in the Importance of Documentation

The creation and early stages of a company strongly affect the position and power of the publicatons department. If a company developed its product through R & D and did not document it, then the documentation function, while necessary, is seen as slowing the creative function and is greeted with reluctance and skepticism. However, if documentation has a strong management advocate or has been important to success in the field, then the documentation department has more internal cooperation and more power to manage.

Identity Crises

One identity crisis for documentation is often the result of struggles in corporate history. The dilemma of the placement of publishing departments everywhere is: do they report to marketing or engineering? A department's reporting relationship may change several times over a period of years. This makes it difficult, to say the least, to establish a stable relationship with internal documentation clients.

Whatever the relationship, there evolves the question of service. Although the manager of the documentation group may report to someone as highly placed as a corporate vice president, perception usually has it that documentation exists only at the whim of and for the total service of the marketeers or engineers to whom it is tied. Although publications may have to serve a much larger constituency, this breadth of responsibility is never acknowledged when the interests of the reporting organization are at issue.


Engineer writes data sheet for product or uses existing data sheet
Correx from Japan incorporated by originators and Communications Dept.
type manuscript clarify additions
Is it original?
= no
rewrite
to originators for approval
= yes
edit and proofread, spec for type and design
clarify and incorporate changes into manuscript
to Art Department for line art
to compositor for typesetting
proofread
proofread
= No
All correx done?
All correx done?
= No
= Yes
paste-up
= Yes
to originators for approval
clarify and incorporate changes into manuscript
= No, art changes still to do
All correx done?
= No, text changes still to do
= Yes
hold mechanicals to go to printer
when all repro is correct
to printer plates made
check "blues"
All correx done?
= no
mark blues submit changes
= yes
print
distribute

Documentation Flowchart Illustrating the Publishing Process at NEC Electronics Inc.

The services expected of a publication group may vary by company size and present problems of definition. It could be a group that publishes everything for everybody, from the most mundane blank forms to excruciatingly technical manuals. It could also be a single person at the service of a few engineers. The skills and aspirations of the publication group may exceed what the group it serves believes is necessary. An ill-defined publication function can lead to nerve-wracking over- or under-expectations.

Dealing with Great Expectations

Technical personnel typcially see publishing as an irritation, not as a necessary part of presenting the technology. It is not unusual for an unenlightened engineer to submit a 20-page handwritten manuscript one week and ask for her or his typeset copy the next week.

Because those not trained in publishing do not understand it, the documentation manager must inform and educate the client (in this case, company colleagues) in the process and goals of publishing.

An effective approach I have used at NEC is to forego the explanation for a visual presentation. A copy of the documentation flowchart is enclosed. This flowchart helps the engineer/authors to understand where their documents are in the process and helps in negotiation. For example, if an engineer requests changes when a data sheet is in the blues stage, using the flowchart in a discussion to show the process required to add the change is far more effective than a financial argument.

Carpe Diem

Time is of the essence in high-tech publishing. The longer it takes to get your documentation to the market, the longer your product is selling with a handicap.

In scholarly publishing, a document is created with the expectation of lasting a scholastic lifetime; perhaps 50 years. In high-tech, the information is expected to last through the first release, that is, until the next version of the product is made faster and better: perhaps six months.

This means that creating the smoothest, most consistent documentation is secondary to the need to quickly create accurate information. It is better to create the format, style, and presentation to a "good enough" standard within the best possible time frame.

Software development departments and companies require that the product be documented concurrent with its development. This forces the writing and production schedule to accomodate the software development schedule. While this results in a timely release, it can still sacrifice some accuracy. The programmer can make critical software changes late in the development cycle because software packaging is typically faster than document production. These changes may not be documented in the manual until the next release. This problem is typcially handled in "Release Notes," an on-line file or paper document containing last-minute changes.

Reviewing and Negotiation

Technical material may require several reviews before it is judged fit to print. A single person can be responsible for review and authorization, or many people may have a chance to stir the soup. The number of reviews and reviewers with unpredictable schedules can throw the best-laid schedule off track. John Hey, of Sequoia, uses the following rule:

WHERE n = the number of people in the approval cycle
AND t = normal approval cycle time,

THEN:

$$\text{total time} = 2^n * t$$

Engineers benefit from constant tutoring in the documentation process. An early review of a manuscript and a meeting with the authors can eliminate delays in the document's future. If everyone agrees on the level of editing, rewriting, and processing required for the document and clearly defines the end-user, the final review stages of the document can go more smoothly.

Money is No Object

Cost accountability is a primary consideration in scholarly publishing. The BEQ (Break Even Quantity) for each book is calculated before manufacturing to ensure that the information package is profitable.

The cost of high-tech documentation is trivial compared with the cost of the technology. Documentation departments, just as engineering/development departments, are usually cost centers instead of profit/loss centers. Documentation is overhead, and is often distributed as a marketing piece.

Clout Follows Information

Clout without respect is simple tyranny. A lack of respect is generally caused by a lack of information. When all parties know and acknowledge what is involved in the work at hand, then there is enough information to determine what constitutes a favor and what makes a hindrance.
The rule of "ask a silly question, get a silly answer" applies all the more to technical interactions. When working with engineers, it helps to frame questions in their jargon as much as possible. It isn't necessary to know what they know; after all, that's what they get paid for. It is necessary to give and receive explanations until everyone knows what everyone else is saying. Jargon, like any other language, can be picked up by those who are surrounded by it.

Service is not a question of subservience. The more that other people know what you do, how you do it, and see evidence of its being done, the greater the credibility of the group. It is as important for the documentation function to broadcast information internally as it is to produce for external users.

Acknowledgement of the contributions of all professionals involved in the creation of a document furthers credibility in and understanding of the publishing process. I am indebted to Carolin Combs and Chris Jellow for their help in the developmental editing, art, and presentation of this paper.

Managing Economic Resources

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This paper describes the management of tangible and intangible resources for the two journals and a magazine produced by IBM's Corporate Technical Publications. Brief descriptions of the publications are followed by overviews of some corporate philosophy and operating unit practices that apply to their planning and production.

INTRODUCTION

The purposes of the IBM Corporate Technical Publications are 1) to provide a "window" through which employees, customers, and the general public can view the science and technology behind the company's products and 2) to offer a forum through which our scientists, engineers, and computing professionals - as well as many innovative users of our products - can present their work and be recognized for it. The benefits of this effort are largely intangible - it contributes to the reputation and credibility of the company and of its people and products, but not directly to development or revenue generation. It is accordingly viewed as overhead, which means the resources it consumes are limited and must be carefully managed.

That environment has required us to develop some fairly structured approaches to planning, as well as some practices in the use of staff, equipment, and services, to be sure we are making the most of what is available. In describing these, I've tried not to write a textbook with a lot of process details or financial statistics. Instead I emphasize principles and ways of looking at things as I overview our management of several kinds of resources.

THE PRODUCTS

We publish three technical periodicals, two journals and a magazine: the IBM Journal of Research and Development is a bimonthly, refereed journal covering original work in applied research and engineering by IBM technical professionals; its readers are peers of the authors both inside and outside the company. The IBM Systems Journal is a quarterly refereed journal publishing both archival and tutorial articles by IBM authors on computing systems, architectures, languages, and applications; its readers are users of computing and include employees, customers, and the general public. The third publication, Perspectives in Computing, carries quarterly articles in magazine format on innovative computer applications. Both its readers and its authors come primarily from the academic and scientific community outside the company; most are professionals in disciplines other than computing.

The Journal of R&D has an international circulation of about 30,000 of which about 3,000 are paid subscriptions, 13,000 are sponsored for customers by IBM's marketing divisions, and 14,000 are company employees. The Systems Journal circulates about 70,000, of which 5,000 are paid, 35,000 go to customers, and 30,000 go to employees. Perspectives is distributed without charge to a similar set of readers; its circulation was about 23,000 when this paper was written and will probably exceed 30,000 by the time it is published.

RESOURCES

Our operation is staffed by 22 people; fifteen are professional and seven administrative. Each publication has its own editorial staff, which is responsible for editorial policy and planning, acquisition, technical editing, peer review, and company clearances. A publications staff handles copy editing, design and graphics, production and supplier services, circulation, budget and cost control, and operational planning for all three. One professional supports technology resources and applications for the staff.

The annual functional cost (purchased goods and services), combined for the three publications, has averaged just over $1 million per year for the past three years. Of that, about $150,000 per year has been recovered from paid subscriptions and $800,000 from direct cost transfers to IBM marketing units. The remaining functional expense, plus all internal personnel costs, occupancy and overhead, and in-plant services, are underwritten by Corporate Headquarters, which as a whole is funded through annual cost allocation to the operating divisions. The total figure is considerable, and since we are not yet able to rely on subscriptions for survival, our publications represent a nontrivial business cost to the company.

RESOURCE MANAGEMENT TOOLS

To plan and control that business cost, we have several tools, or practices, which have developed over time. Some, such as the company's personnel philosophy and strategic planning process, are generally taught and applied by management throughout the corporation. Others, more specifically related to publishing, have evolved within the Publications staff through research, experience, and a good bit of trial and error.

PEOPLE

Needless to say, our most important resource is people, and effective people management is our most important task. Our personnel philosophies and practice are well known, however, and need not be covered here, but it is worth noting that every manager spends at least 50 percent of his or her time on this responsibility and considers the time well spent.

PLANNING

Probably our next most important resource management tool is a structured approach to planning. Based on technical and product strategies, economic projections, and resource allocations that derive from the corporate business plan, we first develop a functional plan for each year that considers each element of publishing. It includes subjects, sources, and priorities for the material we intend to publish, as well as projections of page and print-order volumes and circulation trends and targets. The evolution of style, design, and format is also considered, as are projected changes in requirements for staff, equipment, and suppliers. Those goals and requirements are carefully prioritized. In parallel with that forecasting process we also maintain a continuing analysis of ongoing actual expenses. This includes monthly reviews of itemized costs against budget, quarterly updates of trend lines for major components of cost, and immediate cause-and-effect reviews of significant anomalies or exceptions. Asset utilization is also tracked, and the mix of staff operations, in-plant services from outside our unit, and purchased (supplier) services is reconsidered often as the environment changes and technologies evolve.

The budget itself is developed annually from a zero base, with every component itemized in terms of current costs. Contingencies are accounted for, however, by attempting to recognize risks and unknowns and by examining the track record of our "actuals." We do not work backward from an arbitrary dollar target, but instead are required to justify our allocation in terms of the goals and priorities of our operating plan.

SCHEDULING

Perhaps the most wasteful and costly practice in publishing is failure to operate on schedule. This creates a constant "crisis atmosphere" and planned priorities give way to a series of peaks and valleys of largely unplanned effort. Costs go up, frustration is high, and efficiency and quality suffer. The key to schedule discipline, however, is *not* rigid rule by management, and walls full of detailed deadlines simply do not work for us. Instead we "time line" every task in advance, *before* editorial, production, and supplier schedules are set, with the advice and consent of the people performing that task. Then we work backward from our publication dates (here, working backward makes sense) to develop reasonable lead times, keeping our list of deadlines to a necessary minimum. By keeping everyone, including suppliers, involved in the *planning* of schedules, there is greater commitment to maintaining them, and while Murphy's law has not yet been repealed, keeping the structure as simple as possible allows it to be more flexible.

EQUIPMENT

Our current equipment environment includes terminal-based text processing, which is networked on a corporate host system so that authors can write, edit, and transmit their material electronically to our editors. A certain amount of editing and format coding is done on the same system, by our staff, and most articles are "interfaced" on magnetic media (floppy disks) from our system to a supplier for final composition. We also have networked word-processing workstations, which can be used as terminals but have their own local printers for administrative work and correspondence.

We have had to learn, however, to choose equipment applications carefully, because in our organization it is easy to overload on hardware simply because it is there. Too-frequent change and retraining is a bar to productivity, and choices need to be based on the nature of the work, not on what is most easily available nor on the perceptions of others who aren't familiar with the function. The key is to "own" the business case ourselves - to justify equipment based on our operating plan, rather than the other way around.

SUPPLIER RELATIONS

Because our operation is not large enough by itself to sustain commercial-quality in-house final composition, printing, or mailing, and because other publication operations in the company are too dissimilar to be shared, we rely on suppliers for these services. With upwards of $1 million in purchased services, it is obvious that managing the supplier relationship is a key responsibility. IBM's purchasing practice relies on competitive bids, and there are a number of other conventions that are followed company-wide. Within that general practice, however, we have developed our own approach specifically for graphic arts and printing. It has five basic steps: The first is to *specify* all requirements, in detail. The second is to *identify*, using any available source, a set of a half-dozen or so prospective suppliers who can generally meet the requirements. Step three is to *qualify* the prospects by directly communicating specifications and standards, then following up with plant visits, business reviews, inspections, sample work, consulting references, and occasionally purchasing sample runs of our own publications. Final qualification is based on meeting *or* exceeding the defined specifications, and all who do either are eligible to bid. The fourth step is to obtain the actual bids. Each supplier is given the opportunity to submit *one* itemized quotation, by a set deadline; late bids and second quotations are not accepted. Finally, all valid bids are evaluated jointly by Purchasing and ourselves, and contracts, usually for two years, are awarded to the low bidders.

Once contracts are in place, we also have some guidelines for the ongoing working relationship. We strive to manage to *results*, without involving ourselves in the supplier's procedures, although we maintain frequent communications regarding work in progress and scheduling. We give the benefit of the doubt on any misunderstanding, and always pay promptly. We accept absolutely no gifts or gratuities. Finally, we operate in such a way that we do not become a "lifeline" for any given supplier. Contracts are relatively short-term and new bid opportunities are frequent, and we constantly search for new suppliers who can qualify for our work.

CORPORATE SERVICES

The final resource I shall cover is corporate services, which include personnel, data processing, purchasing, legal, education, and finance - among many others. The role of the manager here is to recognize the support that is available from these areas, and to deal with them as assets rather than aliens. On matters in which we are not expert, the expertise of others is invaluable; knowing when and how to call on them is often the difference between success and failure.

SUMMING UP

In all, resource management for publishing is not very different from any other sort of management; it simply amounts to conscientious planning, organizing, and controlling. Perhaps I have given some insights into our specific "world" of publishing, but I prefer to conclude with more general ideas that should apply to any enterprise:

- People are the foremost resource.
- Planning should be continuous, and all work should be planned work.
  - Develop planning data and keep it up to date.
  - Believe and apply the data.
  - Know, in detail, what your operation can do and what it is expected to do.
- Always do the "dirty work" first.
- Quality is cost effective.
- You are not alone.

Genesis and Evolution of a Conference Publications Office

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By observing the facets of your job in technical communications that make you most enthusiastic, you may be able to create a position that is appreciated by others, makes your job more rewarding, and leads to management responsibilities. The management at Oak Ridge National Laboratory (ORNL) was willing to take a chance with an idea, conceived by me, to form a centralized conference publications office, a service that has proven to be extremely successful.

Scientists who chair technical conferences or symposia are generally unfamiliar with the details of conference publications preparation. The Conference Publications Office at ORNL, established in 1981, has relieved the scientific staff of these responsibilities by providing conference publications expertise that has ranged from production of a simple conference announcement, to design of elaborate concurrent-session programs, to interaction with national publishers in arranging for the editing and printing of proceedings. Established within the Technical Publications Department of the Information Division, the group has grown from an idea to a highly desired service supplied by a staff of four, with additional assistance available from division support personnel and outside subcontractors.

INTRODUCTION

Each person should, at least once in a lifetime, do some soul searching. In my case, this self-appraisal occurred during a Career Planning Workshop at Oak Ridge National Laboratory (ORNL). After several weeks of exercises, which might be described as a painless and inexpensive process of psychological evaluation, I realized that I was happiest when I was being creative, attempting something new, and offering a needed service. In my job as a technical editor, I had found the time spent creating a conference brochure and editing the proceedings most enjoyable and rewarding.

The next step was to follow the guidelines set forth by the leaders of the workshop. I investigated the opportunities available, determined that a need existed at ORNL for a centralized conference publications office, and proceeded to sell the idea.

GETTING THE IDEA

Several years of my life had been spent as a technical editor in a small publications group embedded in a research division. I had reached the stage where the job had become routine and where personal growth had reached a plateau. At this point I was assigned the short-term task of helping with publications for a conference. My supervisor gave me examples of material prepared for previous meetings and assumed that I would follow the same style. With the concurrence of the conference chairman, I tried something different. I did use some of the format of the earlier work, but that was where the similarity ended. Instead, I worked with graphic artists to design an attractive brochure that was printed on a type of paper we had never used for that purpose. When the job was completed, the chairman was extremely pleased. My supervisor, stunned, said, "This is nice, but I'm afraid you may have spoiled it for the rest of us. Now everyone will want something of this quality."

Those were prophetic words, because that is exactly what happened. Each of the three editors in our small group was suddenly immersed in the design of artistic brochures for other conferences. Our work included announcements, calls for papers, and programs. As an unexpected bonus, I was also given the responsibility of editing proceedings, and that is where my career really changed.

Only two weeks had been allowed following the conference to complete all work on the proceedings of the meeting for which I had designed the preconference material that had "spoiled it" for the other editors. Suffice it to say that two weeks was insufficient. The last paper was not even received until six months after the conference, and the final product was a 1200-page hard-cover book. The only way to get the job done was on my own time, and I really burned the midnight oil! For several months I did little after work other than edit. My reward, however, was multifold—a postcompletion party hosted by the conference chairman at which the honored guest was a two-foot-thick manuscript entitled "The Midnight Express"; my name on the title page, small but definitely there; and, most important, I had never been happier with my work.

DEVELOPING THE PLAN

It was at this time that I was fortunate to be enrolled in a pilot workshop on career planning. The main thrust of the program, now available to all interested employees, is to make the participants think about themselves, what they enjoy most, what gives the greatest satisfaction, and how this can be applied to their work. When I realized that I had never enjoyed my job more than when I had been working on that conference, I began investigating the possibile ways to make conference publications work the major part of my profession.

Previously, each person who had assumed the responsibilities for chairing a conference muddled along in the most expedient, but not necessarily the most efficient, manner. This frequently meant begging or borrowing assistance from any possible source. Generally, the people working on conference publications were as inexperienced in publications matters as the chairperson. Research scientists or engineers, diverted from their prime objectives, seemed to lose valuable time while trying to produce the various conference publications, which frequently included the proceedings. The words composition, phototypesetter, makeup, and reproduction—much less their meanings—were more than they wanted or had time to learn. The worst part was that the final product was often less than professional in content and appearance.

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I proceeded to research the situation. I discussed it with everyone who might be a resource person, talked with many people about where and how a conference publications office might be funded, and planted many seeds about the need for such a service. I knew I was on the right track when one of the ORNL managers, in the throes of producing proceedings for a conference he had chaired, told me it would be worth almost any amount of money to have someone else available to finish the job he had started. "After all," he said to me, "what do I know about author instructions or how to prepare this mess of camera-ready (whatever that means) material for reproduction? And what in the world is a halftone?"

This was the impetus I needed. I immediately proceeded to write a proposal for establishing a centralized conference publications office. Then came the question that was most important: To whom should the proposal be addressed? I concluded that only one person would have the authority to set the idea into motion—the director of ORNL.

Fortunately, ORNL managers have a scheduled time for open-door sessions with employees, and I took advantage of one of these sessions to see Dr. Herman Postma, the director of ORNL. I went to his office prepared for a thorough presentation and defense of my idea. Not only did I have my written proposal, I also had examples of material that demonstrated the difference betweeen conference material prepared by the person untrained in publications and by the professional editor. Dr. Postma read half of my one-page proposal and immediately told me that he liked the idea. I didn't even have the opportunity to show the samples I had worked hard to compile. But it didn't matter—he liked the idea, and I was elated!

However, Dr. Postma presented one problem I had not anticipated. Although the idea was good, he would not fund it out of ORNL's overhead account. Money for the position, he said, was something I would have to generate.

Again, contacts were made, doors were knocked on, telephone calls were resumed. Finally a temporary home was found for the ORNL Conference Publications Office in the Technical Publications Department of the Information Division. Costs would be charged to the client, as are any other expenses of that department. It was to be an experimental program, but a few people were enthusiastic about it and they were willing to give me a chance to prove its worth. There was no assurance that the service would be accepted by chairmen as an additional cost to a conference, meeting, or symposium; that I could convince conference chairmen that a technical editor and publications manager would increase prestige and quality and actually save them money; or that conference committee members would agree to let an outsider handle details of the various publications.

Was the service wanted? I contacted several people who were either already involved with or were about to become involved with coordinating a meeting. ORNL has a full-time staff available to handle conference arrangements other than publications, and I worked closely with them to determine which chairmen would need publications assistance. By the end of the first month I was averaging almost 60 hours per week trying to keep up with the volume of work. *I* needed help!

CONCLUSION

It is now three years later. More than 50 conferences have had some phase of their work completed by the Conference Publications Office, which has become a permanent part of the Technical Publications Department. The staff has been augmented by three full-time employees, and support is available from other departments in the Information Division and from area subcontractors. Interdivisional cooperation has made the job rewarding and hard work has made it a success. People who were willing to support an idea have made it all possible.

I have learned many things I never thought I wanted to know, such as how to estimate a budget; how to schedule work so that all contingencies are considered (at least, most of the time); how to become a supervisor without having had previous experience or training; how to keep accurate records, because without them additional help cannot be justified; and how to coordinate the work of other people and other departments. I have grown as a person and as an employee, and I am certainly more valuable to my organization and more enthusiastic about my work than I was several years ago. Each day holds a new challenge, new people to meet, and new opportunities. In other words, I have achieved new and continuing job satisfaction.

Program Evaluation: The Research and Systems Approaches

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Program evaluation is inescapable in today's economy. Thoughtful managers know that they cannot continue programs which do not contribute as desired to the organization's objectives. To evaluate program evaluation as a management concept, Karna and Ramsey discuss three clusters of concerns: (1) cost, organizational goals, and "worthiness"; (2) information as a function of clients; and (3) consideration of the research and systems approaches to program evaluation.

Program evaluation is a particular type of evaluation in management (1, 2, 3, 4, 5, 6). It is concerned with the "value" of a particular program or program elements. Program evaluation has become a key concern of management, both government and private. There is of course some inevitable controversy relative to use of program evaluation in the management processes of human services. Evaluation is basically a systematic and objective method of looking at where a program presently stands and estimating how a program can do better. The final outcome of any evaluation process is change. Change is an integral part of this examination--change to serve the clients better and to improve program economy.

COST, ORGANIZATIONAL GOALS, AND WORTHINESS

The need for program evaluation has developed rapidly in the past several years. There are many reasons for this trend. Specifically, the decade of the 1970s has been termed the age of accountability--a fact which has a direct effect on all of the human service programs. No longer are public funds available without questions asked about the program's value to the public and to the target service populations. There is an increasing need to justify the "work" of human service programs. Also, importance of program evaluation is growing, under federal stimulus, particularly in view of large federal deficits. The overriding reason to engage in program evaluation is the need to restrain costs. Inefficient programs sap an organization's financial resources.

The amount of cost must, however, take into account the utility of the goal which the program is intended to meet. Even the term program evaluation suggests some methodology concerned with finding out how well programs are working in terms of goal achievement. This methodology may be outlined as follows:

1. Define specific goals or objectives.
2. Establish quantifiable criteria from which to evaluate these goals.
3. Develop methods of comparing program outcome to the criteria.
4. Design the evaluation.
5. Collect the information needed.
6. Analyze the results.
7. Develop conclusions and recommendations.

This analysis of the cost and goal of the program is inevitably subjective, depending as it does on different managers' perceptions of worthiness. The basic goal of program evaluation is to estimate the worthiness of a program. But "worthiness" is much too diffused and ill-defined a concept to be of much practical use for developing a program evaluation plan. Instead, development of a statement of a program evaluation is of great importance in clarifying and delineating what is going to be done in the evaluation. Figure 1 depicts how worthiness may be charted in terms of input and output variables.

INFORMATION AS A FUNCTION OF CLIENTS

The basic questions to be asked in developing the design for program evaluation are as follows:

1. What benefits and costs are associated?
2. What differences in service outcome occur for the different client groups?

The success of the evaluation techniques would depend on the following factors:

Output Input	Immediate Goals	Intermediate Goals	Long-range Goals
1.			
2.			
3.			
4.			
5.			

Figure 1. Input and Output Variables in a Program Evaluation

1. Type of information available
2. Descriptive client information
3. Funds available
4. Precision required
5. Measures of program effort, such as services rendered to each client
6. Measures of program effectiveness, such as decreased processing time for claims
7. Measures of program efficiency, such as the determination of other client services, other developmental effects

Program evaluation can be only so successful as the accuracy of the information on which it is based. Special attention must be paid to information which comes from clients. Such information is of the nature of feedback from those on whom the livelihood of the organization most depends.

RESEARCH AND SYSTEMS APPROACHES

There are traditionally two ways to go about program evaluation:

- The research approach
- The systems approach

These two approaches represent two different ways of thinking about goals, programs, and problems.

Research Approach

Briefly, the research approach is inherently inductive. This means that specific facts, combined in some way, will show a relationship from which a general theory can be drawn.

The research approach often takes the form of operations research and cost-benefit analysis.

Operations research is the application of scientific methods, techniques, and tools to problems involving the operation of a system so as to provide those in control of the system with optimum solutions to problems. One of the most popular applications of the operations research approach is cost-benefit (7, 8). Cost-benefit analysis can be applied wherever program inputs (costs) and outputs (benefits) are both measurable in money terms. Whereas cost-benefit analysis is readily applicable in evaluating projects that give rise to a stream of purely private benefits and private costs, such analysis becomes increasingly tenuous for public programs which have significant externalities. Whereas some sort of social discount rate may be used in the evaluation of such public programs, it is the choice of the monetary discount rate figure that is problematic.

Selection of the monetary discount rate involves the following definitions:

1. Opportunity cost of capital: One conventional practice is to use a measure of the opportunity cost of capital in the private sector as the discount rate in cost-benefit studies of proposed public-sector activities.

2. Social discount rate: The social, as discerned from the monetary, discount rate involves the consideration of humanitarian concerns. There is a view that holds that the private opportunity cost of capital is inappropriate for discounting the future benefits and costs of public-sector programs. Whereas there is some controversy over what constitutes the appropriate procedure for arriving at a discount rate, in many instances this controversy does not need to concern the cost-benefit analyst. The conventional method for identifying those situations in which the exact value of the monetary discount rate is crucial is to perform a sensitivity analysis--that is, to calculate the present value of benefits and costs for at least two alternative monetary discount rates. Such an analysis would be based on a relatively low monetary discount rate (for example, 5 percent), and on a relatively high rate (say, 15 percent) to test the sensitivity of the cost-benefit estimates to changes in the rate. If the analysis reveals that the cost-benefit measures are relatively insensitive to changes in discount, the matter essentially ends there. If the study's findings are sensitive to the particular monetary discount rate selected, the policy makers might make their own judgments regarding the appropriate magnitude for the monetary discount rate.

In cost-benefit analysis, four criteria for accepting or rejecting programs have been set forth by Bierman and Smidt (9) as well as others:

1. Payback analysis: The payback analysis shows the time needed to recover the costs with benefits. This method helps evaluate programs according to whether they are capable of generating benefits prior to the cut-off period enough to cover the costs. This method does not take into account the benefits and costs beyond the payback period, no matter the length of the period for which the benefits and costs are forecast.

2. Internal rate of return: The discount rate that just equates the present value of benefits to the present value of costs is the internal rate of return. The program is acceptable if the internal rate of return exceeds the private opportunity cost of capital or the social discount rate.

3. Net present value: Net present value is the difference between the present value of benefits and the present value of costs, both being discounted at a rate equal to the private opportunity cost of capital or social discount rate. The program is acceptable if the present value of benefits exceeds the present value of costs.

4. Benefit-cost ratio: This is an extension of Criterion 3. The ratio is calculated by dividing the present value of benefits with the present value of costs. The program is acceptable if the ratio thus calculated has a value greater than 1.0.

The merit of the research approach is that it is ideally unencumbered by preconceived conclusions as to what's what in the program; the demerit is that the research approach can be inefficient: what is wrong with a program may be as obvious as the nose on the face, but the spirit of research urges that all remote possibilities be tested.

Systems Approach

The systems approach is deductive in that it takes a general overview of a program, breaks it into specific units, and then draws conclusions. The systems approach has developed rapidly because of the advent of computers (10).

The systems approach often takes the form of systems analysis or systems engineering.

Systems analysis and systems engineering describe a program in terms of the structure of the system and its subsystems and the processes by which the function of each system and subsystem is accomplished.

Systems analysis may range from description, to analysis, to forecasting or prediction of the feasibility of alternatives. The major difference between systems analysis and operations research is the scale of the project and the time projection. Operations research usually provides more immediate solutions to problems.

The systems approach has the merit of being logical and coordinated; the demerit is that the system may be more logical and coordinated than the world of real flesh-and-blood relationships in a human organization can ever be. Consequently the systems approach searches in vain for a problem and a solution which are not within the system.

CONCLUSION

Exclusivity is not needed when one has to evaluate the comparative merits and demerits of the research and systems approaches. Rather, managers should consider the merits of each approach, to borrow from these merits and to form the best-of-all-worlds synthesis between the two. Practical business people in management roles rightly disdain frameworks which try to idealize amorphous human relationships into polar opposites; such managers are more concerned with the realities of meeting long- and short-range goals within the constraints, financial and otherwise. Consequently, program evaluation should consider the research and the systems approaches equally and simultaneously. Efficient, responsive management requires that program evaluation be pursued with a flexible, adapting approach which attempts to track reality.

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Managing a Successful Editorial Group in a Multidisciplinary Consulting Firm

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This paper discusses the experience of a publications manager in setting up an editorial group for a multidisciplinary consulting firm. The key to the success of such an endeavor--then and now--is service, flexibility, and adherence to time and budget constraints. The technical and managerial staff has to be convinced that editorial support will be individualized to meet their needs. And they have to be convinced that the added time and expense of editing will pay off in a better product.

An international firm established in 1938, Dames & Moore has 40 worldwide offices and has completed nearly 40,000 projects. Until 1978, the firm's Washington, D.C., office had operated with no supporting in-house editorial assistance. Throughout the 1970's, Dames & Moore was producing numerous multivolume studies--often involving dozens of writers. It was eventually realized that an editorial staff would provide effective production control and ensure a higher quality product.

The professional staff was presented with a definition of the various levels of edit, along with detailed estimates for editing, proofreading, and word processing. The appropriate level of edit was then selected based on discussion with the project manager, after considering the objectives of the project, its purpose and function, the number and type of authors, and the project budget and schedule.

Dames & Moore's editorial group supports the firmwide objective of responsiveness to client needs by working with the technical staff to ensure a high quality product completed within time and budget constraints.

INTRODUCTION

Dames & Moore is an international consulting firm with 40 offices worldwide. Founded in 1938, the firm's initial focus was the practice of soils and foundation engineering. Now, 40,000 projects later, Dames & Moore is recognized around the world as a leading multidisciplinary consultant. Its professionals include civil engineers, economists, geologists, and oceanographers.

Over the years, particularly since 1970, Dames & Moore has produced thousands of project reports and technical proposals. Through the 1970's, project reports were typically comprised of multiple volumes, such as environmental impact statements and siting studies for electric utility companies. Technical proposals, too, were often several hundred pages in length, in response to complex RFP's for multiyear, multisite programs.

It was not until 1978, however, that the Washington, D.C., office of Dames & Moore--the firm's largest office, with nearly 200 professional and support personnel--made the decision to add an editor to its professional staff. I was the person hired to set up and manage an editorial group. Although I came to Dames & Moore with more than 7 years of experience in technical editing and writing--mostly with the U.S. Government, and had 3 years of management experience, I knew very little about private industry. Probably the major factor in my adjustment to Dames & Moore was making the switch from having the time to do a high quality job to working under tight time and budget constraints. I will talk more about this later.

I was faced with quite a challenge--a fairly conservative group of engineers and other specialists who had managed to produce reports and proposals up to this time without any editorial assistance. Fortunately, I was able to spend my first 9 months working as the editor on a multiyear project for the U.S. Department of Energy's Strategic Petroleum Reserve Program. This provided an opportunity to demonstrate my editorial skills without the added responsibilities of management. The project manager was satisfied with my work (he had a prior appreciation of the valuable contributions an editor can make), and gradually I began working on other projects and proposals.

THE EDITORIAL PROCESS AT DAMES & MOORE

By May 1979, I was managing a staff of four new editors and four word processing operators. We had the support of management, though even they were somewhat skeptical; I would say that only 10 percent of the technical/marketing staff even understood what was meant by "editing." It was a rough road--with most of the project managers wanting to avoid the editorial process as an additional project expense. They thought that their work did not need editing, that one of their entry-level professionals could provide the same service, or that they did their own editing. And besides, why should they risk having editorial changes made to their text? They felt that the risks far outweighed any advantages.

Initially, and this lasted about a year, management announced that word processing services could not be used without going through the editors. We quickly presented three levels of edit and explained that the project or proposal manager could choose the level most appropriate for his or her work. Based on our collective experience, we also devised time estimates for the levels of edit:

- "Comprehensive editing"--4 pages/hour, particularly appropriate when several authors are involved.
- "Standard editing"--5 pages/hour.
- Copyediting--10 pages/hour.

These estimates are based on double-spaced text. We also developed separate estimates for proofreading, as follows:

- Initial proofreading--7 pages/hour.
- Proofreading after copy has gone through word processing for initial revisions--12 pages/hour.
- Proofreading final corrections and revisions--20 pages/hour.

The second proofreading step is often repeated once or twice on large or controversial documents.

Similarly, we developed estimates for word processing time. These included three levels of input (including complex text with equations) and three levels of revision:

- Input
  - Fairly clean typewritten copy, edited--8 pages/hour.
  - "Average" copy, edited, with several handwritten inserts--5 pages/hour.
  - Complex text, edited, with several equations per page--2 pages/hour.
- Revisions
  - Light revisions--15 pages/hour.
  - Medium revisions--two or three one-sentence insertions per page, deletions, and some rearrangement of text--8-10 pages/hour.
  - Heavy revisions--major deletions and additions--5 pages/hour.

Our word processing operators use Xerox 850 full-page display units.

The key to the success of the editorial group has been flexibility. We had to convince our "clients" that we would respond to their needs on an individual basis, that we would tailor our methods to match their time and budget requirements. Also, Dames & Moore has no set format for publications. Reports are organized and presented in whatever way seems most appropriate to the project's objectives. Proposals are organized in response to specific requirements in the RFP.

We try to ensure that the editor originally assigned to a job continues to work on it from start to finish, even though an extended period of time may elapse between draft and final stages. Likewise, and of equal importance, the original word processing operator continues on the input and revision stages, even when completing a phase of work involves overtime, though we always bring in a second person when necessary. We have found that this saves time and money, and ensures continuity in style; more importantly, it gives the operator a sense of personal accomplishment.

In terms of time and budget constraints, a key element of our editorial procedure is minimizing the number of times a document goes through word processing. Aside from the obvious quality improvement provided by editing, this is the major difference in publications production now and prior to 1978. At that time, a document was revised in word processing each time anyone made changes! You can imagine the chaos--with no central coordination point, and the added cost of operator and machine time. Now the editor controls the document through all stages of revision.

It is here that I must emphasize the importance of accurately predicting the number of anticipated review stages, since review cycles add substantially to editing, proofreading, and word processing costs. If the document is controversial for one reason or another, if several people at top levels of management have an active interest in the report or proposal, or if people from different discipline areas are involved, it is advisable to include extra revision cycles in your estimates.

At Dames & Moore, a well organized and managed report or proposal will go through just four cycles:

- Initial input (after editing).
- Revisions from the author's first review.
- A second series of revisions.
- Final corrections.

This is why our estimates are fairly accurate; of course, adjustments are made and extra time added if we are working with an author who is not organized in his or her approach to reporting information, or if the document is of a sensitive nature and might require several levels of management review.

OUR ACCOMPLISHMENTS

The Washington, D.C., editorial group has become a firmwide resource. After several years of concentrated effort, we have convinced the technical and managerial staff of the value of editing and publications control. Our services are especially requested on project reports that will be subject to public review and comment and on major proposals.

For 5 months in 1982, one of our editors worked in Dames & Moore's Santa Barbara office on two major environmental planning studies for Exxon and Shell. Another went to our Cranford, New Jersey, office to edit a controversial shore protection manual for the State of New Jersey. In 1981, I made two 2-month trips to our office in Cairo, Egypt, to work with the resident project staff on the Sinai Development

Study, Phase I, for which we prepared a 10-volume project report--covering all phases of potential development, from water resources and agriculture to tourism.

In late 1982, we suffered a major cutback in staff resources. With a correspondingly reduced workload, our current staff has generally been able to handle all scheduled work. We often rely on Editorial Experts, Inc., in Alexandria, Virginia, for temporary editorial help, and two former employees are available to assist in word processing. There have been several occasions, however, when we have not been able to work on a specific project or proposal because of other commitments, in which case, the project or proposal manager is forced to set up a separate production team consisting of one or two other staff members and secretarial support. The mission is accomplished, but with scheduling and production complications and a product of lesser quality.

We have now reached a point where most of the staff (maybe 85 percent) is not only convinced of the value of editing, but also will schedule weeks or months in advance to ensure that sufficient editing and word processing time is allocated for their work! Whenever we cannot meet a request because of other commitments, our services are sorely missed. So, we have come a long way since 1978 when our staff support probably amounted to 5 percent.

As most of you are aware, the challenge is always there--either to convince a new author that your editorial review will enhance his or her presentation, or to work with a repeat author on a new project report or proposal. Undoubtedly, it is this synergism that gives editing its sparkle.

As editors, our most important challenge at Dames & Moore is to continue to provide a high quality editing service, while at the same time enhancing the firm's overall productivity. With management and technical staff support, we now have only to look forward to increased technological support in terms of better equipment and improved interoffice communication.

SPECIAL APPLICATIONS

Although we expect to update our word processing equipment this year, we have developed special programs to make use of many of the features of the Xerox 850. For example, in our file of Dames & Moore curricula vitae, which number in the hundreds and fill two five-drawer file cabinets, we have coded versions for each professional employee. One individual might have five CV's--each emphasizing a different aspect of his or her experience. Each CV is coded with a disk number and a sequential letter, beginning with "A." An index card is filled out for each version, showing the date, the specific proposal for which it was prepared, and the disciplinary area of emphasis. Those of you with consulting firms or private industry can readily identify with the tremendous effort required to maintain an active CV file. Master copies of all versions of each person's CV are readily available to the staff. The original hard copy is maintained in a separate file and used to reproduce more masters.

We have also set up a retrieval system for the CV's of special consultants--non-Dames & Moore personnel. These CV's are used mainly for our international work. All resumes originally sent to Dames & Moore by potential consultants are edited and retyped in a special format. The consultants are categorized by area of expertise and by countries in which they have worked. This 100-page index is then used to identify qualified individuals for inclusion in specific proposals.

Another application, also related to proposal preparation, concerns the storage and retrieval of project data. Descriptions of completed and current projects form a major portion of most of our proposals. Each project description includes information on the client, location, scope of work, period of performance, and cost. We are able to retrieve these project descriptions by client, location, or key words.

The Older Worker and New Technology

Herbert B. Michaelson, Moderator

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All aspects of technical writing, graphics, editing, type composition, printing, and publishing are affected by newly developed technologies. Innovative methods and new procedures are the order of the day.

The older worker, faced with learning new ways of getting the job done and using new tools of the trade, is abandoning certain traditional methods in the workplace. The expertise developed by the older worker over the years must now be adapted to the use of products and systems now produced by the electronics, data processing, and printing industries.

The speakers on this panel will discuss some pros and cons of rapid changeover to new techniques. They will also cite some triumphs and failures of the older worker in the new regimes.

The panelists are;

Harry Pappas, President, STC
Westinghouse Electronics Division
Pittsburgh, PA

Dorothy Saxner, STC Fellow
American Hospital Association
Chicago, IL

A. Stanley Higgins, STC Fellow
Westinghouse Research and Development
Pittsburgh, PA

Lynn R. Bedell, STC Associate Fellow
Consultant
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Specifying a Publication

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WHAT THIS WORKSHOP IS ABOUT

Developing a publication is like developing any other product. And in each case the first step is in many ways the most important step - because the rest of the project carries on from there.

The first step in developing a publication is to specify the publication - just as the first step in developing any new product is first to specify the product. There are three major questions to ask in specifying a publication (or any product):

- What is its intended function?
- Who is its intended audience (market)?
- How is it to be presented to that audience (packaged)?

This Workshop will address these three questions - each of which gives rise to a whole series of more detailed questions; it will also raise some of the problems involved in specifying publications.

WHO SHOULD ATTEND THIS WORKSHOP

This workshop provides publications professionals - especially managers - with specific tools for dealing with one of their more critical job functions - specifying publications. It may also be helpful to them in educating the people in other departments (marketing, engineering, etc.) who are ultimately responsible for publications.

THE STRUCTURE OF THE WORKSHOP

The workshop will essentially be an open discussion group for debating these questions and the possible responses for several different types of technical publication. To give the discussion a concrete focus, and to hone our decision-making skills, we will use an actual example product, and discuss some alternatives for documenting this particular product. An example manual actually prepared for this particular product will be available for examination and further discussion.

DETAILED AGENDA

The workshop will discuss the problems of specifying publication in terms of the three major questions mentioned above. Each of these major questions is broken down into a series of more detailed questions, as follows:

What is the intended function of the publication:

- Is the publication primarily to promote or to support the product?
- If it is a support publication, is it primarily for training or for reference?
- How urgently is the publication needed?
- How broad is the publication to be?
- How deep is the publication to be?
- What is the intended distribution of the publication?
- What is the anticipated lifetime of the publication?

Who is the intended audience of the publication?:

- How well do they read?
- How competent are they technically?
- How well do they accept the product?
- How far away are they?
- What are their reading conditions like?
- How willing are they to read the publication?
- How many of them are there?

How is the information to be presented to the audience?:

- How is the publication to be related to other publications (existing or planned)?
- What is the overall publication to look like?
- How are the pages to be designed?
- What existing corporate standards, if any, apply to this publication?

None of these questions results in a simple yes/no answer: in each case there is a range of responses. The answers to all these questions form a multi-dimensional matrix, and the combination of answers is unique for each particular publication.

How to Give Effective Presentations

Karen Johnston

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The purpose of this article and the workshop that has evolved from it is to help professionals - especially those in the technical fields - be maximally effective in front of groups.

Unlike the more academic and research oriented papers in Proceedings, this is a "how to" article. That is because public speaking is a skill that requires practice. We didn't learn to drive a car without practice and we can't learn to be more effective in front of groups without practice either.

However, we can in writing begin with some basics. This article will outline pitfalls to effective presenting and summarize some techniques to eliminate them. The accompanying workshop will focus totally on techniques and do's and don'ts.

We'll cover the following topics:

- How to handle nervousness
- How to prepare effectively
- What delivery skills to develop
- Use of visual aids

Nervousness

Research[1] shows public speaking is the number one fear people have. It is an even greater fear than death! (Perhaps that's because you only die once but you might have to give another presentation!)

When we are nervous, the body enters into the fight flight mechanism, as if we were in physical danger. Blood goes to the muscles, eyes dilate, breathing gets short and shallow. Sugar is released into the blood stream, hands get clammy, feet are cold and thoughts race uncontrollably.

As speakers, we can use breathing techniques, visualization, self-awareness, effective feedback and exercise to counteract the fight flight mechanism and our nervousness.

Preparation

The most common mistake presenters make is to prepare for an oral presentation the way we prepare for a written paper. When we do this, we lose connection with our audience in our search for the exact word, and in our presentation, we become comatose with the thought of forgetting where we are.

Verbal language and written language are very different. That's why keeping a folder of ideas, examples, and possible main points is important. This way, you have material to draw from and can organize it in a rough outline form. From here, don't write; talk into a tape recorder. Your playback will help you learn your speech and this in turn will increase your confidence.

If you don't use a manuscript, what do you use for notes? You use note cards to, in an abbreviated form, write down what you're apt to forget instead of what you would probably remember. Examples of what people are apt to forget are statistics, the transition phrases, humorous comments and words that are hard to pronounce. By the time you have taped your presentation several times, you are able to determine what notes you need in front of you.

Delivery Skills

Delivery skills involve HOW you say what you say. They include volume, gestures, rate of speech, articulation, eye contact, gestures and elimination of extraneous words and sounds.

These skills will be demonstrated in the workshop.

Has your intelligence been insulted when a presenter flashed a transparency on the screen, passed out a copy of the transparency for you to look at - then proceeded to read the copy to you?

This is only one example of the many ways visuals are ineffectively used. Sometimes presenters use visuals that can't be seen, put too much on a transparency, show too many slides or transparencies, don't make effective use of color and erroneously believe that spoken words are remembered better when those words are repeated visually.

This important phase of giving effective presentations requires demonstration. That will happen in the workshop.

There will be times in the workshop for questions from the audience and teaching time will be apportioned according to the interest of the audience.

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[1] Wallechinsky, David, Wallace, Irving, Wallace, Amy. The Book of Lists. New York: William Morrow, 1977.

Making Meetings Work: Successful Techniques for Better Meetings

Mary Lou LaPierre

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Techniques exist which can make meetings productive. Once these techniques are learned, meetings can produce creative solutions to complex problems encountered in our everchanging environment.

Participants in this workshop will learn the basics of group dynamics, how to create agendas which keep meetings moving and on-target, how to use brainstorming and nominal group process to increase participation and group creativity, techniques for handling difficult group members and the skills for making concise, substantive presentations.

Participants will take part in a mock meeting to practice the skills and techniques introduced.

WORKSHOP OUTLINE

Introductions: Facilitator will introduce herself giving a little background about her experience in meeting management and asking each participant to introduce themselves and identify their most frustrating meeting problem. Problems identified will be used to determine the emphasis of the workshop.

Group Development: The four stages of group development will be introduced by the facilitator. Group members will be asked to suggest activities which might fall into each of the four stages. Facilitator discusses theories about how groups develop into productive working units.

Creating an Agenda: The purposes of an agenda will be discussed and the outcome frame method for developing an agenda introduced. Participants will be given a case study designed around a typical technical communications situation and asked to develop several agenda items using the outcome frame method.

Brainstorming and Nominal Group Process: These techniques for productive problem solving will be explained. Participants will use nominal group process to generate as many creative ideas as possible for conveying technical information about a new product.

Dealing with Difficult Members: Using the brainstorming technique, participants identify the various self-centered behaviors often observed in meetings. Facilitator will discuss ways to neutralize these behaviors using roleplaying and modeling techniques.

PRES Model for Presentations: This concept for making concise meeting presentations will be explained and demonstrated by the facilitator. Individual participants will be given the opportunity to make short presentations using the model.

Mock Meeting: Using a case study, small groups will be formed and a chair and recorder chosen. An agenda will be decided upon and the meeting conducted. Approximately 20 minutes will be devoted to performing the meeting tasks using whatever techniques the group choses. The final 10 minutes of the workshop will be devoted to a discussion of how the mock meeting progressed.

All participants will receive a selected bibliography and a model for conducting effective meetings.

Research, Education and Training Stem

Jan C. Robbins, Stem Manager

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The Research, Education, and Training Stem of the 31st ITCC is designed to present a program broad enough to address the needs and interests of those concerned with technical communication research, education, and training, but narrow enough to assure that our attention is not diverted from the best our colleagues have to offer. The principal criteria for program selection were intellectual quality, sophistication of treatment, and importance of topic.

Three program sessions are devoted to recent technical communication research. The first of these is theoretical, with papers on the relation between authors and editors, readability analyzed from the perspective of historical linguistics, and the variables of revision. The second is empirical, with papers on the relation of report characteristics to report readers, the use of field-test groups to improve information materials, studying comprehension problems, and report format preferences. The third is pedagogical, with papers on computerized instructional models, methods of student and course performance evaluation, and use of the Delphi method in course development.

Four sessions focus on technical communication education. One deals with computers, offering papers on creating a course in software documentation, using word processing to teach composition, using word processing in teaching proposal and grant writing, and what we have learned from the experiences of students as new computer users. A second deals with special educational problems, with papers on the role of scientific literature, statistics, and linguistics in the tech. comm. classroom. A third panel details, through slides and personal accounts, the remarkable success of the Los Alamos National Laboratory technical writing internship for high school students. A fourth deals with developing student internship and co-op opportunities, with papers detailing successful efforts at three different sites.

Four sessions examine the future of research and education in technical communication. One focuses on the issues of accreditation and certification, one on the development of sound technical communication education programs for the future, one on the role of the Education and Research Special Interest Group (SIG) in STC, and one on the strengths and weaknesses of current technical communication graduate programs, as seen from the student point of view.

Finally, we have programmed a number of useful, precisely targeted workshops: one on teaching proposal writing, one on using reference bases for constructing and communicating technical concepts, one on teaching oral technical presentation, one on training technical editors, and one on improving in-house writing improvement programs.

There will be very little overlap in Research, Education, and Training sessions at the 31st ITCC, so anyone who wishes can plan to attend almost every element of the stem program.

Technical Writing for Teenagers: Achievement and Renewal

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Teaching a survey course in technical communication to high school students provides challenging new career ideas for the students and an exciting professional renewal for the instructors. A prototype course is described from conception through planning and funding to presentation. The program coordinator, instructors, and students participate in this evaluation and in the panel presentation.

Celebration! This was the musical theme of the slide presentation that was flashing on the screen on this last night of the semester. The presentation and the party to follow were a gift to the students who had given us so much. As the weary instructors watched this pictorial review, we also remembered cold dinners, cranky mates, children demanding equal time, and hobbies untouched for these four months. Perhaps we should have been celebrating the end, but we knew we were really celebrating a beginning. As those wonderful, youthful faces appeared on the screen, sometimes pensive and then alight with discovery, we felt renewed, as we had each night of class. Every picture reminded us that we who had come to give had been the receivers.

It all began with a memo. "The Department of Energy has agreed to fund an Advanced Career Training (ACT) program at the Los Alamos National Laboratory," the memo read. Just what I needed—more training to cut into my already hectic schedule! As the memo was in transit to the wastebasket, another phrase caught my eye—"ACT students will be high school juniors and seniors..." Now, why would the Director of the Laboratory be sending every employee a memo about high school students? Curiosity drove me to read on and discover that not only were we being asked to volunteer our skills, equipment, and space, but, most importantly, our time for planning, preparation, and teaching. Classes were to begin October 6, and it was already August 20? Impossible!

I didn't know it, but I was about to launch into the most exciting six months of my career in technical communication. The contents of that memo and attached proposal nagged at me throughout the evening. Tempting my imagination was the part that said that the purpose of the ACT program was to "encourage northern New Mexico youth to choose careers in science and technology, to prepare participants for transition from school to employment, to increase educational offerings at local high schools, to provide a future pool of trained individuals..., to reduce unemployment by raising the potential socio-economic level...." A course in technical communication could meet all of those goals because in its breadth our profession offers a variety of careers. Why, we could design a course to be taught by people from every discipline within technical communication—writers, editors, illustrators, photographers! We could teach units on movies, computer graphics, technical presentations, museum exhibits, poster sessions! For students to have this exposure while still in high school would be a real boon to our profession!

Having worked myself into a frenzy of excitement, I could hardly wait to share my idea with the Program Coordinator the next morning. Her encouragement prompted me to enthusiastically volunteer all my colleagues to assist with the course. However, later in the day as I filled out the application, sensibility replaced euphoria, and many questions began to plague me. Just who was this nameless "we" who would design and coordinate the course? Had I misrepresented the interest of my colleagues? Where would we meet? Where would we find the time?

Because I had taken the first step, I thought I should see it through until I could find someone to take over the coordinator's job. The logical resource for instructors was our Los Alamos Communicators group, which included professionals working in every phase of the communications business. I wrote a hasty memo intended to solicit volunteers and sent it to our members through interoffice mail...and then waited and hoped.

To my surprise, just after the next mail delivery my telephone began to ring with queries from scientific staff and technical communicators alike. Some volunteered to teach, others to assist in preparation of materials, and still others just to be on call to help when and where needed. Curiously, in every conversation I heard the same words—challenge and excitement. They were challenged by the prospect of reducing the daily routine to teachable skills and excited at the prospect of interacting, sharing, and teaching. The enthusiasm was infectious, the word spread, and soon we had 35 instructors and more volunteers than we could use. Just as quickly we had a course coordinator, because I wasn't about to miss the fun!

Thus began the Technical Communication course that was to be one of six courses taught during the first semester of the ACT program. This pilot program was modeled after a successful program that had been operating at Rockwell International for 15 years. At the end of the first year, our program was redesigned and renamed the Los Alamos Science Student Program (LAASP). In part, it fulfilled the Laboratory's commitment to develop an educational outreach program that would enhance and support science and engineering education in northern New Mexico. The administration of the program is funded by the Department of Energy, but its instructors and students give two hours on two nights each week for 27 class periods. The two semesters each year run concurrent with the school year.

The courses that are given in any year are dependent on the individuals who respond to the Director's memo inviting participation. The courses are designed and planned by those who propose to teach them, with the Program Coordinator available for advice and assistance. The instructors provide a course description, objectives, and outline. In addition to their own materials, they are encouraged to use resources and special facilities the Laboratory offers that might be pertinent to their course such as the technical library, the Bradbury Science Museum, movies, and tours.

The students are chosen from among applicants from five regional high schools, with half being Hispanic or Native American, and thus bilingual. To apply for entrance to the program, they must write about themselves, their career goals, and how they think the course of their choice will help them. They must also have two letters of recommendation from their teachers, and in some cases, they must have completed prerequisite courses. Once selected, the student must be very dedicated and determined to succeed. These highly motivated young people travel up to 35 miles to Los Alamos after a full day of school, participate in a two-hour class, then drive as many as 50 miles home, thus delaying their evening meal and homework assignments until at least 9 p.m. In return, they receive academic credit from their high schools with the course listed on their transcripts but no grade given.

Where did we communicators fit into all this? That was the first question we asked ourselves when we met to plan the Technical Communication course. Thirteen students had been assigned to us, most of whom had indicated a preference to take a course in computer science. However, we tried not to be discouraged by their initial lack of interest and reviewed their applications for hints to help us create a meaningful course content. The mixture of backgrounds convinced us that we should start with the very basics of information handling, progress to various methods for presenting information, then apply these newly learned skills to a variety of forms of technical communication. Our long-term goal was to give them skills that would help them to successfully complete secondary school, assist them in finding summer employment, and encourage them to continue to post-secondary education with a confidence that they could succeed.

Recognizing that professional technical communicators are not produced in 27 class periods and that the four months would pass quickly, we laid out a curriculum that would blend learning with application. No one subject could be covered in depth, so we planned the course as an overview, with units from one hour to sixteen hours long. Homework was not allowed, so the basis for every exercise had to be something we could demonstrate in class or an experience familiar to all the students. The resultant course looked something like this.

AN INTRODUCTION TO TECHNICAL COMMUNICATION

A slide and videotape presentation defined the course and introduced the instructors and all the subjects we would cover. To give us a baseline against which to work, the students then participated in a simple form of communication and tested its effectiveness by writing instructions for getting to their homes from our classroom. Instructions were exchanged with another student who attempted to draw a map based on the written instructions. When the students saw how their instructions had been translated, the exercise ended with much laughter—and insight!

ORGANIZING INFORMATION

- **Organizing Your Thoughts.** We taught a simple method for deciding what you want to say, organizing the information into one of several structures to meet the needs of particular audiences, then writing the final document. This was applied to memos and letters in which the students solicited the support of school officials and local merchants for various homecoming activities.
- **Writing for Your Audience.** This was a simple demonstration of using the appropriate language to convey a message at the level that your intended audience could understand. A space plasma physicist presented a dramatic film strip on a subject unfamiliar to the students—solar winds. He then gave them a paragraph he had written for a report that was intended for a lay audience. With the help of editors and the physicist, the students rewrote the paragraph that was replete with technical terms into something they and a lay audience could understand.
- **Rewriting and the Author/Editor Interaction.** The paragraphs rewritten by the students in the previous session were typed and returned to them. They were guided through a simple editing and rewriting exercise by technical editors.
- **From Text to Illustration.** A photographer demonstrated the effectiveness of replacing text with appropriate illustrations by using written instructions for the operation of a jack-in-the-box, then replacing them with pictures.
- **Observing and Taking Notes.** An engineer taught the students skills for observing a process, recording accurately what they saw, and writing text from their notes. As an example, he used a simple laboratory experiment with a lab report as the end product.

PRESENTING INFORMATION

- **Oral Presentations.** Writers from the publications group taught some beginning skills for interviewing. The students then interviewed a classmate or an instructor and prepared a short extemporaneous speech

to introduce them to the class in an interesting manner. Next they selected one of several suggested topics concerning their life experiences and developed it into an oral presentation complete with illustrative viewgraphs. This reinforced their ability to organize material coherently and taught them the new skills of viewgraph preparation and oral presentation. Their talks were critiqued by their classmates.

- **Preparing the Written Report.** Students observed a demonstration of state-of-the-art word processing equipment and how it is used to produce reports. Then they participated in sizing and reducing illustrations to be used in the text and waxing them to the report mats.
- **How Computers Work.** In preparation for future units, students toured the Central Computing Facility and the Computer Documentation Section to obtain a basic understanding of computers and computer documentation.
- **Using Computer Graphics for Illustrations and Movies.** A computer graphics expert presented computer graphics as a creative media for producing report illustrations, slides, and movies. Some award-winning computer-generated movies illustrated the innovation and excitement of this communication form.
- **Manuals as Instructional Writing.** A technical manuals supervisor helped the class improve on its first attempt at giving instructions by teaching them simple procedures for describing processes and the use of equipment. They applied them by helping the instructor rewrite several pages of a manual that was in production at that time.
- **Poster Sessions.** A chemical engineer presented an award-winning poster session. As students learned how it had been put together from concept through planning and construction, they also subtly learned something about chemical waste disposal.
- **Technical Books.** A successful published writer of technical books shared his methods for developing an idea into a plot, then presenting it to publishers and working with book editors.
- **Museum Exhibits.** Several editors who were helping to redesign exhibits in our science museum presented these and other exhibits as forms of communicating technical information. Students were then given randomly chosen items and asked to prepare an exhibit illustrating some concept.
- **Graphics.** To help the students express themselves in form rather than in word, two graphics artists discussed the development of an idea in two and three dimensions, then led the students through an exercise to illustrate dimension with copper wire.
- **Photography.** A Laboratory photographer taught the students how to operate a 35-mm camera, frame a picture in the viewfinder, select subjects and setting, and develop their film. They then were given assignments to take pictures in other ACT classes, develop their film in the darkroom, and print their pictures.

APPLICATION OF SKILLS

Bringing together all their newly acquired skills, the students produced an eight-page newsletter about the ACT program to be distributed to all the program participants on the last night of the semester. The four-week project was directed by a team of writers, designers, and photographers from the special publications group, so the students worked in the publications environment. They volunteered for assignments as writers, editors, or illustrators. With the guidance of the team, they chose an editor and a name and design for their banner, planned the stories to be included, assigned them to writers, and planned the photographs to go with the stories. To add interest, they solicited artwork and creative writing from students in other ACT classes. Then they planned the layout, wrote the stories, edited each other's work, took the pictures, developed the film, made the prints, and typeset the headlines. When they completed the paste-up, security regulations prevented their being present to see the presses roll. Despite last-minute problems, the newsletter was ready for distribution to friends and family just one week after the original deadline.

The students elected to extend our class by a week so they could complete the newsletter themselves, so closing ceremonies came just a few nights before some of the seven who finished the course would begin the second semester in a different course. We were all tired, but students and instructors alike agreed on one thing—this class was the best thing that had happened to any of us for a long time. The students had opened their eyes to many new possibilities for their future, learned practical skills they could use now in the classroom, learned to work cooperatively with people of other cultures and backgrounds, and most important, learned to believe in themselves as achievers.

The instructors received much more than they had given in time and preparation as we watched them work their way through problems and grow nightly, almost before our eyes. Most of us had become so focused on the ruts of our jobs that we had lost the excitement with which we had entered our profession. Defining the processes by which we accomplished our jobs had made us reexamine purpose and procedure. Watching the excitement of the students as they learned reminded us of why we had chosen to be technical communicators and led us to new ideas for both our jobs and our professional development.

Celebration was indeed an appropriate theme for the closing festivities of this course, for it was a celebration of achievement for the students and renewal for the instructors.

Teaching an In-house Proposal Writing Course

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Proposals represent one of the most critical writing tasks that many companies face. Millions of potential sales dollars may be won or lost according to how well a proposal communicates its message.

Yet proposals are often written by people who know very little about writing. These people are selected for the task because of their technical knowledge, rather than their writing skills.

Writing professionals, such as in-house editors, can offer some assistance. But the tight deadlines associated with most proposals, combined with their extensive length, make it impractical for writing professionals to completely rewrite the entire draft. Usually, a band-aid approach is all there is time for--a quick correction of some of the most blatant problems, along with a little additional polishing of a few key sections.

The best solution that we have found to the proposal-writing dilemma is to give the entire proposal team a quick course in the basics of good proposal writing. If the course is held just before the team begins working on the proposal, they will be highly motivated to learn, and some impressive results can be achieved.

Of course, such training will not eliminate the need for the expertise of professional writers and editors: a brief course is not going to turn technical professionals into skilled writing professionals. But it will do a great deal to improve the clarity, persuasiveness, and responsiveness of the drafts that are turned in to the in-house writers and editors. Writing professionals will then be free to concentrate their efforts on final polishing of the draft material, instead of trying create a coherent story out of what is, in many cases, little more than raw data.

The focus of this workshop is on how to create and teach an in-house proposal writing course. It is intended for anyone who might be involved in developing or teaching such a course, whether a manager, writer, editor, or human resources specialist.

One of the first points we will make is that teaching an in-house proposal writing course is different, in many ways, from teaching a general course in effective writing. Proposal team members, although highly motivated to learn, don't have either the time or patience for a theoretical approach to good writing--or for a detailed review of the rules of grammar and punctuation. They need a course that is hard-hitting and direct--one that will provide them with some simple, practical rules that they can apply when they sit down to write their drafts.

Accordingly, all concepts presented in the course must be:

- Easy to understand
- Illustrated with numerous examples (of both right and wrong applications)
- Supported with exercises that will allow participants to gain practice in applying the new concepts
- Capable of making a significant difference in the persuasiveness and clarity of participants' writing

In our workshop, we will show participants how they can structure the contents and approach of their in-house course to meet these criteria. We will also present some ideas for the types of exercises that might be included. (We'll even give participants the opportunity to try out a few!) Finally, we will offer suggestions for gaining management support for the course--a critical requirement for the success of any training effort.

Recent Research in Technical Communication I

Richard C. Freed, Moderator

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As technical communicators, we don't require that research have immediate application because we understand the importance of speculation, of giving the mind free reign to light where it pleases and discover what it will. But we do feel better, I think, when the speculative grounds itself in the useful, when research not only identifies and analyzes problems but also begins to solve them as well. Each paper in this session combines, to varying degrees, the speculative and the useful, and each treats important issues in technical communication.

In his speculative paper, Jan W. Broer discusses the concepts "feedforward" and "metaphoric transfer." These concepts can be used by technical communicators as tools, not only to analyze intended audiences in order to shape their documents but also to analyze and thus give shape and meaning to their very careers as technical writers and editors.

In the process of arguing that revising for readability is similar to translating a foreign language, Robert J. R. Rockwood illustrates the practical problems facing technical communicators who must comply with certain readability requirements. According to Dr. Rockwood, the Department of Defense readability requirements will have an enormous effect on how technical writing is composed.

Glenn J Broadhead and Richard C. Freed identify and discuss the taxonomy they use when analyzing the revising practices of proposal and report writers. The results of their two-year study may shed new light on how technical communicators compose and revise, and provide new strategies for training technical writers.

The papers in this session suggest the wide variety of research being performed by academicians and by technical communicators themselves.

The Variables of Revision

Glenn J. Broadhead and Richard C. Freed

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ABSTRACT: The revising process involves six variables: the kind of item changed; the process used to make the change; the impetus for the change (voluntary or involuntary); the orientation of the change (toward idea, line of thought, cohesion, or usage/style); the affective impact (high or low); and the norm prompting the change (cultural, organizational, generic, personal, or situational).

Over the past decade, academic journals have demonstrated a growing interest in the composing and revising processes. However, few in-depth studies have been made of writers in "real-world" environments. Indeed, as we began such a study two years ago, we found that the scholarly literature on composing and revising offers little help in non-academic or non-literary areas. To guide our research, therefore, we developed a taxonomy focusing on six "variables" of revision to analyze the writing process in the areas of business and industry. As a research tool, the taxonomy allows quantifiable objective processes to be linked to equally quantifiable interpretations of purpose and motive; we hope it may also offer on-the-job writers some useful insights into the composing process. In the remainder of this article, we will describe each of the variables in turn and then conclude with a sample application of them.

THE SIX VARIABLES OF REVISION

To describe accurately a writer's mental process of revision, researchers need to answer six key questions corresponding to the variables involved in making a change in a text.

Item: What Was Changed?

The items revised may consist of an alphanumeric character or subword (.e.g., -ed, -ing), a punctuation mark, a word, a bound phrase (one not set off by punctuation), a "macrosyntactic" structure (e.g., an independent clause, an appositive, a non-restrictive relative clause), a sentence, a group of sentences (within a paragraph), a paragraph, or a longer unit such as a group of paragraphs (often signalled by a heading), a section, a chapter, etc.

Process: What Was Done to Make the Change?

A revision can be accomplished through the six processes commonly used in word-processing software: insert, delete, replace, move, split, and join. An important point about the processes used in revising is that the relationship between items and processes is not symmetrical; that is, some items can be altered by all six processes, but others cannot. A paragraph, for example, can be inserted, deleted, replaced, split, joined to another paragraph, or moved to another part of the text. But a punctuation mark cannot be split.

Impetus: Was the Change Voluntary or Involuntary?

A particular change may be undertaken for its own sake (hence "voluntary") or it may be necessitated by a previous change (hence "involuntary"). For example, a writer may originally write that "Price is important to our firm." Later, she might realize that "efficiency" is also important. To incorporate this idea into the text, two revisions must be made: first, the words "and efficiency" must be inserted after the word "Price"; second, the word "is" must be replaced by the word "are." Thus, the insertion of "and efficiency" is voluntary, while the replacement of "is" with "are" is involuntary (required because of the first change).

Orientation: What Was the Orientation of the Change?

A revision may be oriented to one or more of four factors: toward the ideas or information in the discourse, toward the line of thought, toward cohesion, or toward usage/style. In general, the first two of these orientations involve the referential meaning and the logical meaning of the discourse, respectively, with changes in referential meaning being produced mainly by insertions, deletions, and replacements, and with changes in logical meaning being produced mainly by moves, splits, and joins. The latter two orientations deal with linguistic aspects of discourse. Cohesion, for example, involves "text-oriented" meaning, or the meaning-creating consistencies of language that operate within a particular text (as described by M. A. K. Halliday's three-part "Notes on Transitivity"). Similarly, revisions oriented to usage/style involve the social meaning or ethos implied by the sociolinguistic choices evident in the text.

Orientation Toward Ideas. A revision oriented toward ideas is a change in the informational content of the discourse, including both vocabulary and the level or amount of development of statements. Many changes in the informational content are very slight, but are nevertheless changes in informational content. For example, if an original text contained the remark "Jim used a hammer to open the door" and a revision changed that to "Jim used a mallet to open the door," that would be a change in information, albeit a slight one. In fact, even if two words had the same extension (referred to the same things), we would consider the replacement of one with the other a change in information if the terms' intensions differed--as in replacing the word "equilateral" with the word "equiangular." On the other hand, if the sentence were changed to "Jim opened the door by using a hammer," the informational (referential) content of the sentence would not have changed, even though the emphasis might be different.

Orientation Toward the Line of Thought. A change oriented toward the line of thought involves such broad factors as the argument, plot, or organization of the discourse, and also includes any minor change in the order of ideas that is not prompted by cohesion. That is, even a change in the order of structures in a sentence could be a change in the line of thought. For example, if the first sentence below were replaced by the second, it would constitute a change in the line of thought:

> Since Aristotle is human, and since all humans are mortal, Aristotle is mortal.
>
> Since all humans are mortal, Aristotle is mortal, because Aristotle is human.

It is of course much more likely that such a change would be oriented toward cohesion (e.g., to connect this argument with a previous discussion of the mortality of humans), but it is at least theoretically possible that, since English is linear (one word coming after another), very small changes in the line of thought may occur. Bare possibility aside, it remains the case that most changes in the line of thought involve much larger stretches of discourse.

Orientation Toward Cohesion. A revision oriented to cohesion is a change in the signals of relationships between one part of the discourse and another. Generally, such revisions involve insertions, as in adding a transitional expression (such as "next" or "for example" or "on the other hand") or a heading for a section of the text. But a transitional expression might be moved from the middle of a sentence to the beginning (for greater emphasis), or a bound modifier such as "next" in "He next went to the police" might be split off into a free modifier ("Next, he went to the police"), or an excessive cohesive tie might be deleted.

Orientation Toward Usage/Style. As the cross-categorized jumble of topics in most "grammar and usage" handbooks might suggest, "usage" and "style" are very often imprecisely defined, and refer vaguely to a broad range of practices and mispractices. However, we may at least distinguish two main kinds of injunctions in the handbooks: those that are urged because they promote conformity with the practices of some desirable group (e.g., "good writers"), and those that are urged because they improve the clarity or understandability of the text. Among the former would be the injunction to use the desirable "is not" instead of the undesirable "ain't"; these are classified as being oriented toward usage/style. Among the latter would be the injunction that pronouns ought to have a clear reference; these are classified as being oriented toward cohesion.

Affective Impact: Did the Change Alter the Reader/Writer or Reader/Text Relationship?

Each orientation can be further differentiated by whether it has low or high affective impact. Low-affect orientations address only the cognitive relationship between the reader and the discourse. For example, a writer discussing a disease might describe its symptoms so that doctors could understand how to recognize it. High-affect orientations, on the other hand, address social relationships between the reader and the writer or the reader's feelings about the discourse. For example, a writer discussing a disease might describe its symptoms in gory detail so that laymen would want to avoid contracting it. High affect appears to be much more common for changes oriented toward line of thought or idea than for changes oriented toward cohesion or style.

Norm: Why Was the Change Made?

Every revision, of course, involves a motive, a reason. The number of possible motives is so great, however, that a listing of all a writer's motives for every revision in every draft of a document would probably be impossible. Our solution is to focus, not on specific motives, but upon the norms writers attempt to adhere to in revising their work. For example, a writer might change the sentence "the major objectives of the report requested by the Governor is to analyze problems and to provide recommendations" to "the major objectives of the report requested by the Governor are to analyze problems and to provide recommendations." The motive for the revision might be to make the subject and verb agree. That and similar motives exist, however, because of a norm--in this case, accepted conventions of usage--that informs, even determines, the decision to revise. Every decision to revise, we believe, is guided by one or more of the following rhetorical-linguistic norms: Cultural, Generic, Organizational, Personal, and Situational.

Cultural Norms are norms common to writers and readers within a given language or (more commonly) within a recognizable group of language users within a culture. These norms are prescribed by handbooks, textbooks, dictionaries, and the like or are implied by the culture's assumptions about the purposes and values of language and communication. They govern rhetorical decisions designed to make the text adhere to a culture's idea of good behavior, good communication, and good writing.

Organizational Norms are common to writers within a particular organization or discipline such as General Motors Research Insttute, Government Printing Office, Modern Language Association, American Psychological Association, Acme Insurance Company, or even Professor Smith's freshman composition class. Examples of Organizational Norms would be documentation practices (such as APA or MLA), in-house style or format guides, organizational or disciplinary injunctions such as "do not use the first person," etc. Organizational Norms need not be formalized in written documents; they can also result from tradition or practice.

Generic Norms are common to writers of a given type of writing (for example, essay, technical report, or novel). These norms govern rhetorical decisions designed to make the text adhere to conventions widely accepted within a certain genre of writing.

Personal Norms are linguistic or rhetorical preferences of a given writer. Examples might be a writer's characteristic use of wit or euphony, or her preference for "sincerely" rather than "yours truly."

Situational Norms are those prompted by a given rhetorical situation, involving the intended reader's norms, the demands of the rhetorical task, etc. They guide writers' decisions about adapting tone, style, format, selection of content, and level of technicality to achieve a specific purpose and to meet the readers' needs in particular rhetorical situations.

All five norms may be usefully thought of as allegorized readers. That is, a writer has not one reader over his shoulder, but five--each corresponding to one of the normative categories. These readers often have different demands that must be satisfied by different rhetorical strategies. And sometimes those demands conflict. For example, consider a proposal writer deciding upon a heading for that section detailing his worksteps. The Generic Reader might demand "Methods" or "Approach" because those headings are most typical in proposals. The Organizational Reader could desire "Plan of Attack" because that heading is most often used in the company's proposals. The Situational Reader may want "How We Will Proceed" because the relationship between reader and writer is informal and personal. And if norms can conflict, they can also merge. In fact, it may be that skilled writers more successfully resolve conflicts between norms by more successfuly creating (and revising for) a hypothetical "target" reader in whom the norms are fused into a single point of view or "personality."

To understand the interplay of the six variables more fully, let us turn now to some illustrations of their application in a real-world context.

APPLICATIONS OF THE SIX VARIABLES

According to our analysis, then, there are six main variables involved in revising: the item changed (eleven or more types), the process used to make the change (six types), the impetus for the change (two types), the orientation of the change (four types), the affective impact of the change (two types), and the norm that prompts the change (five types). In other words, not counting the distinction between voluntary and involuntary changes, any of six processes could be applied to any of eleven kinds of item, with either high or low affect, oriented toward any of four factors, and prompted by any of five norms. As a writer sits down to "revise" a text, therefore, the number of available things to do is 6 x 11 x 2 x 4 x 5, yielding 2640 ways of "making a revision." In actuality, however, fewer than 2640 ways exist, since some of the concatenations of the variables are not possible (e.g., one cannot split an alphabetical character or a punctuation mark). Even so, the sheer quantity of ways that are possible supports the increasingly common claim that revision is a complicated process. Thus, we should not be too surprised if an otherwise competent person has not mastered the actual process of revising.

Nor should it be surprising that we will not try to account for all possible combinations of variables in this paper. Rather, we will try to give an overview of how these variables might interact, focusing briefly on some revisions to a hypothetical text.

Let us suppose that the writer is an employee of a firm that manufactures and sells large and small computers. During the past quarter, sales of small computers have declined 25 percent, so the firm's Director of Sales and Services has asked the writer (who is the Assistant Director) to investigate the matter and then write a one-paragraph report that identifies the cause of the decline and recommends a solution. This report will be sent not only to the Director, but to other top executives in the firm as well, so the assistant (new to her position) may need to exercise considerable care in her short memo, and might be expected to revise it carefully. Writing hurriedly, she produces the following first draft:

1 Sales have decline dramatically in the last
2 quarter. There are four causes for this.
3 First, and more important, advertising policy
4 is directed toward the private users, rather
5 than the small bus. market. This is wrong
6 because home computers are a luxury for most
7 people, while small computers are of great
8 importance to many small businesses, and being
9 tax deductible, are more economically feasible
10 for businesses than for homes. Second, our
11 commission plan for sales personnel encourages
12 sales of large rather than small computers,
13 since the comission for small is 10 percent
14 and the comission for big is twelve percent!
15 There has been some slightly higher than
16 average turnover in personnel (eight in all)
17 during the last quarter that might be thought
18 to have had some effect on sales. But the new
19 salesmen have as good a record of sales during
20 the quarter as our veterans. Finally, there's
21 some low morale on the part of many salesmen
22 to our sales polciy.
23 Since these advertising policy is obviously
24 the main effect, spend some money to devise a
25 new focus on small business.

Let us now look at some changes to this draft that would illustrate the interplay of the six variables involved in revision. We must keep well in mind that we are not here presenting a model of the composing process, but rather systematically illustrating some relationships between the six variables.

One set of revisions the writer could make to her first draft might be oriented toward aspects of usage and style, prompted mainly by cultural norms. Thus, in line 1, she might insert the letter "d" after "decline" to regularize tense; she might replace the abbreviated "bus." (line 5) with the word "business"; she might replace the contracted "there's" (line 20) with "there is"; she might avoid the shift from declarative to imperative by adding "we should" before "spend" in line 24. In addition to these cultural-norm, low-affect changes, however, she might realize that her reader-boss hates exclamation marks, and thus might replace that mark in line 14 with a period (a high-affect usage revision); or she might remember that her company observes the "rule of ten" for numbers and words, so that she would replace "10" with "ten" in line 13--a low-affect, organization-prompted, usage-oriented revision.

A second set of revisions the writer could make might be oriented toward cohesion. In this case, since only two of the "four" causes announced in the frame sentence "There are four causes for this" are marked by enumerative signals ("first," "second"), the echoing adverbial free modifier "third" (punctuated by a comma) could be inserted before "There" in line 15; this would also require a secondary change of the upper-case "T" in "There" to a lower-case "t." For the same reason, the word "finally" in line 20 could be replaced by "Fourth." Also, since the paragraphing in the first draft is illogical (two of the four causes being discussed in the first paragraph and another two in the second paragraph), the second paragraph might be joined to the first; or a series of splits might set off the discussion of each "cause" into a separate paragraph. In a longer report (especially one with short paragraphs), the headings "Causes of the Decline in Sales" and "Recommendations" might be inserted at appropriate points. Finally, the cohesive word "these" in line 23 might be replaced by the reader-writer unifying word "our"--a high-affect, cohesion-oriented revision prompted by the rhetorical situation.

A third set of possible revisions could be oriented to the line of thought. On the one hand, the writer might come to think that low morale is not a cause of the decline but is instead an effect of the decline; thus, she might eliminate a step in her argument by deleting the sentence ranging from the middle of line 20 through line 22--a low-affect change prompted by a cultural imperative to be accurate. This change would also require a subsequent cohesive change in line 2, replacing "four" with "three." A high-affect line-of-thought change might be prompted by the writer's realization that the "advertising policy" that she attacks right away was thought up by her irascible boss, who tends to blame others for problems rather than himself. Thus, she might recast her line of thought by moving the discussion about the advertising policy's defects so that it follows the discussion about personnel turnover; this move would deemphasize the attack somewhat, and would also decrease her bosses' potentially antagonistic response by first citing causes he is more likely to concur with.

Low-affect, idea-oriented revisions might most likely by prompted by general cultural imperatives about communication, such as those hypothesized by speech-act theorists (e.g., Be concise, Be relevant). For example, the writer might check her notes and realize that six, not eight, persons were replaced during the quarter, and she would therefore replace "eight" with "six" in line 16. If motivated by situational norms, the writer might realize that not all of her readers would know that the decline in sales is confined to small computers, rather than large ones; so she might insert "of small computers" after "Sales" in line 1. Conversely, if her first draft had included three or four sentences describing the small computers in detail, she might delete those sentences as being unnecessary for the executives to understand her claims. Or if she thought that "in the last quarter" (lines 1-2) was potentially vague (since it could refer either to the quarter coming to an end as she wrote her report or to the quarter before that), she might replace that phrase with the more specific "between January and March, 1984."

High-affect changes in idea motivated by situational norms might also occur. For example, though eight people may in fact have been replaced during the previous quarter, the writer might believe that this information would needlessly alarm the executives, so that they would not accept her claim that personnel turnovers were not a significant cause of the decline; hence, she might replace the specific word "eight" with the more general (or more vague) word "several," or perhaps might insert the reassuring qualification "only" before "eight." Or she might believe that, while the sales strategy is "obviously" the cause, it would be insulting to say so to the person who commissioned the report and to others who will read it; so she might delete the word "obviously" in line 23. In a later period of revision, she might decide that the claim in lines 23 and 24 (that the advertising policy is the main cause of the decline) is too strong for a subordinate to make to superiors; thus, she might insert the word "apparently" after "is" or else replace "is" with "may be a significant."

Naturally, many other combinations of variables are possible, but these examples illustrate some of the most common motives and procedures for revision in one sort of real-world setting. By analyzing drafts of texts for these six main variables, as we are currently doing with drafts of proposals in a management-consulting firm, we can create a full record of a writer's revisions. Since this record is easily quantifiable, an author's shifting emphases between items, processes, levels, orientations, affective impact, and norms can be expressed as percentages or rates--information which can help guide and refine qualitative analyses of the differences between texts. For example, if only 10 percent of a writer's second-draft changes are of high affective impact, but 40 percent of her third-draft changes are of high affective impact, then we can hypothesize that the writer's "revision style" is first to deal with non-controversial (perhaps "writer-based") concerns and then to address the controversial ("reader-based") aspects of the writing situation. In addition, these percentages can be correlated with a variety of stylistic features, such as syntactic complexity, variability, and variety, measures of readability, and cohesive ties. Thus, through this method of analysis, we may begin to understand in detail the revising processes of successful and unsuccessful writers, as a first step in improving performance in real-world contexts.

Feedforward and Metaphoric Transfer—Natural Forces of Technical Authors and Editors

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Feedforward, writing and editing from 'formators' (titles, outlines, topic sentences, abstracts, visual elements) is recommended. Text, a distribution of informative, valuative, and incitive elements controlled by the formators, should match the reader construct. From 27 types the author/editor selects this construct, a three-level estimate of the reader's need for knowing, feeling, acting. People 'emigrating' to technical communication by push-out from languages or science and engineering have feedforward and metaphoric transfer, 'as-if' use of former knowledge, as unique instruments. Metaphoric--transfer examples and an optimum career curve (twin-skill personality) are included.

FIGURE 1. Our Universe. W_S and W_L types of technical writers with a past as scientist/engineer and language expert. W (mostly) future type of technical writers. (S•E) scientist/engineer whose work is being presented professionally. Arrows: interfacing and interpersonal activities.

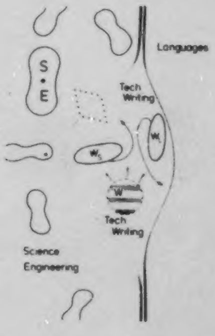

FIGURE 1 — a Borderline Case

This map shows the universe of technical communication, our world, with the language experts in the east and the scientists and engineers in the west. The territory of Technical Writing, and Editing surely, is a borderland in the center. It sits on the boundary, the huge north-south fault line. This rumbling boundary means more than a simple division of human knowledge. To the west people are visually oriented, their thinking is global and holistic; to the east people are analytic and prefer words, with close reading and discrete thought patterning behavior.

In the European scene mostly emigrants populate the territory; they are the professional types W_S and W_L, technical authors/editors with a past as scientist (or engineer) and language expert, respectively. Hyphenated personalities they both are, usually forgetting the hidden richness of their fuzziness. Frequently at odds, the W_S's and W_L's hardly can find time to realize their best advantage, 'metaphoric transfer' (MT). The typical action principle of emigrants, MT is a method of solving problems in the new field by postulating as-if links to well-understood situations in the old field. In this way mental baggage carried over from the old country is put to good (adaptive) use in the new surroundings, of technical writing and editing.

For emigrants, particularly for the W_S's as discussed in [1], MT could become a straightforward and easy working force in technical communication. Examples of prescriptive rules for technical writing obtained via MT are listed below, in the second table.

A third, in Europe extremely rare, kind of professional communicators is labeled W in FIG. 1. The circular shape instead of the elliptic one of W_S and W_L denotes a more balanced and evensided behavior; the white and black striping refers to the smooth adaptability and flexible control the W's show in their chosen field of technical communication.

In America the W's are more noticeable; they are the young university graduates with a double education, for example the Ph.D. in English who added an M.S. in physics before embarking on a career in technical communication or, even better, the Ph.D. in technical communication from Rensselaer who took a second degree in electrical engineering. For the W's the job in Technical Writing and Editing represents their career's first and logical choice ('logical' because of the preceding *dedicated* training at university level), totally different from the miserable situations the emigrants sometimes experience.

Flat and open, by the very idea of communication, and easily traveled from a thousand directions — everybody can write — our borderline territory has turned into the human barnyard for today's crowd of technical communicators. A constant stream of people moves into the territory, either escaping from the adjacent country on their own decision or being pushed, feeling management's decisions, while they watch for a new future to be established upon their scientist--engineer's or language expert's past.

At worst it means just as many personal tragedies, of escape, of overflow, of push-out. Probably for years to come these personality--jolting shifts will affect people who have started their careers in science and engineering fields and, more intensely, people who were originally in linguistics, modern languages, English literature included. Involving a change from doing research to reporting other people's very similar or very different research, the shifts frequently spell identity crises.

East of the boundary no *individual* language people are depicted in FIG. 1. The numbers there who smell the new job opportunities form no longer a small group of scattered 'special cases'; they are a massive crowd on the move.

In contrast, the scientists and engineers will probably never lose the 'special-case' character. FIG. 1 stresses their special status by showing separately drawn (S•E)'s, individuals with the scientist/engineer features. They are the sole customers of the technical communicator; their papers, manuals, reports, proposals, etc. form the things that we, the W_S's, W_L's, and W's, handle professionally to organize and communicate them. We filter and we trim the stuff that the (S•E)'s pile upon our desks.

The raw materials for our territory therefore come exclusively from the west. FIG. 1 signals this lopsidedness by the asymmetric shape; the bulge in former Science and Engineering land is far larger than the one in the direction of Languages.

FEEDFORWARD – the Prime Mover

For any communication-in-the-making corrections and revisions are brought about by feedback, an indispensable mechanism. Nevertheless, beware of seeing feedback as dominant force to guide your technical-communication work. Feedback is not a good principle of creative action – 'feedforward' (FF) is [2]. Yes, FF helps you find outlines, it establishes patterns of relative importance, and it gives the complex future of your new technical communication the perspective of sensible connectedness and togetherness in thinking. Indeed, FF seems the best moving force that writers and editors can employ to bring their audience and themselves in communication. Feedback is remedial certainly, stabilizing at best, but never generating the 'Grand Scheme', the formative pattern. That's what FF does.

Strange enough, FF is an almost forgotten American invention of the early fifties, done by Ivor A. Richards (1893-1979), one of those two illustrious Englishmen who have had the wisdom to come to Harvard at an advanced age, reserving the splendid finals of their intellectual course for their American audience [3]. He described FF as an important human agent, a mental principle, to make language work, and, above all, to determine how a language may best be learned.

We take a small step, I think, when we transfer – metaphorically transfer? – this notion of FF as natural-language-maker to our field and thus advocate more conscious use of FF as the 'natural' way of ***composition***.

In this transfer the hierarchic order, as set by Richards [3], from *more* generic (or more inclusive) to *less*, is to be maintained. In other words, this action principle tells you to arrange your work in technical communication at all levels as nesting series, series of wholes enclosing parts enclosing smaller parts enclosing . . . . , etc.

This top-down way, also familiar in modern computer programming, is 'natural' behavior. In his days Richards has illustrated this with a story of the actions of a hungry grizzly bear – practically equivalent to a Dutch youngster unpacking his endless surprise present on Saint Nicolas Eve.

So far we have discussed MT and FF in an all-embracing and correspondingly unspecified way, in fact an FF way. If we stop now, you could not pick up more than three slogan-like recommendations:

I. Be creative and efficient, take the FF way for your writing and editing;

II. Be imaginative and economic, make MT solve your technical-communication problems;

and, if suffering from an 'emigrant's complex' as a W_S or a W_L (FIG. 1):

III. Be wise, teach yourself to accept your present self, the technical author or editor, as partner and equal of the former scientist (or engineer, or language expert) in yourself, for the Purpose of Communication.

But how? That's the question. Fortunately, FF and MT are not a tool bench without tools [4]. Typical of natural forces, their concrete workings always precede the speculations on their sum and substance.

So the tools must be near. They are not farther away than the next two references, [5] and [6], and the beginnings of this paper, the title and FIG. 1. Title and figure for starters in a technical communication feed forward par excellence, in more than one sense. Their global features, certainly worth studying [7,8], trigger the creation of nesting series of text elements. Thus they help to efficiently set up and guide writing and editing – and reading as well.

FORMATORS – the Feedforward Tools

In [5] and [6] Charles W. Morris (1901), founder of a famous theory of signs, and his eminent, ever so practical pupil Bess Sondel direct our attention to 'formators', the tools to develop text in the FF way.

Besides figures and titles, other examples of formators are graphical plots, diagrams, flow schemes, models, bylines and subtitles, introductory paragraphs, topic sentences, key words, outlines, tables, and abstracts. So whenever you start to write or to edit, open your eyes first to any formators, and if you do not see them, make them – they boost your creativity. The crudest, preliminary version of an abstract at time zero is better than none.

All formators control 'form' at a less generic level, and thus help you create anticipated content, almost automatically and with least effort [yes! Zipf, Ch. 5]. Together they establish a pattern suitable for some intended distribution of three classes of text elements. Morris labels them 'designators', 'appraisors', and 'prescriptors', the three types of signs that represent informative, valuative, and incitive text elements, respectively.

As soon as they have their text setting, the formators function as the systemic elements, the fourth class of text elements. Hanging together in a systemic way themselves, they primarily help the reader understand the text. In addition, formators when confronted with the text elements they are supposed to control, offer extensive checking facilities. This is useful in updating texts, e.g. in service manuals. Confronting systematically all formators present with their corresponding text parts protects author or editor best from errors. Checking the complete interior consistency of the formators themselves should not be forgotten, lest blunders remain.

Knowing, Feeling, Acting – Readers to Match

The intended audience and the distribution of informative, valuative, and incitive text elements are related. First of all, therefore, the author (or editor) must define a realistic audience, i.e. he must construct the type of readers he is after. This audience definition is the primordial FF in his work; tailoring the publication to fit comes later.

The tool, a 'formator', is shown in FIG. 2. This table lists 27 types of readers. The types, based upon the classification of signs proposed by Morris and Sondel [5,6], comprise three elements of need, the needs of knowing, feeling, and acting. The author (or editor) must estimate the relative significance of each element of need, by selecting one level from three (L, M, S). The level represents the degree of predominance the corresponding element of need has in every reader's mind, according to the author's (or editor's) best guess. The postulated type of readers is denoted by a sequence of three letters, each either L, M, or S, the first for the element of knowing, the second for feeling, and the third for acting.

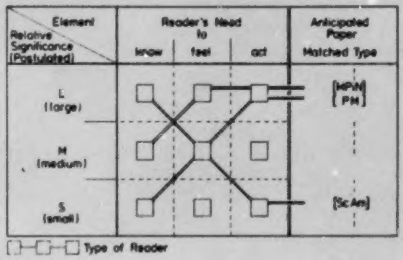

FIGURE 2. Writer/editor's table of reader constructs (max. 27 types; shown 3), based on the estimated reader's need for knowing, feeling, acting ('all there is'). The type selected functions as feedforward in developing a reader-matched paper. MPiN Man's Place in Nature. PM Popular Mechanics. Sc Am Scientific American.

Three of the 27 types are indicated in the table. The type (L, M, S) could represent the retired physicists who sense a large need for new knowledge, but care only moderately about the human feelings involved, and have little or no need for action. This reader construct could feed forward a paper in the style of the Scientific American. The second example, (M, L, L), could represent chemists in ecology, not to keen about new knowledge; they worry much about human feelings being wounded, and can't wait to start environmental rescue operations. Such people are the prospective readers of a Man's-Place-in-Nature kind of paper. The third example, (S, M, L), could represent skilled do-it-yourselfers, whose need for supporting knowledge is nil, whose feelings are the 'it-saves-me-money' attitude, and whose need for action makes them build their own solar energy collectors. Such a type matches a paper on the construction of various energy-saving gadgets in the style of Popular Mechanics.

Concluding, we recommend that the postulated reader construct, as an FF, guide author or editor to make a *conformal* technical publication. The relative significance of the three elements of need, as postulated in the reader construct, is then to be translated into an *equivalent* distribution of informative, valuative, and incitive text elements. 'Equivalent' indicates that the reader's needs are to be met one-hundred percent, neither more nor less [9].

With the advice of translating reader constructs conformally and equivalently into text-element distributions, our MT is called forth again, the hidden richness of the emigrants, W_S and W_L in FIG. 1.

To bring this kind of expertise in the open, the second table (FIG. 3) lists prescriptive rules for technical-writing matters. For more rules and explanatory remarks see [1] and [10].

rule	analog	source
avoid the perfectionist's 'yes, but' style	contrasting petty details block communication of the main line of thought	similarity grouping in visual perception
enhance distinction core/context by 'Old-Testament' style	repeating a core statement in modified form	binocular vision
avoid main-line blurring by ensuring continuity of main line of thought throughout introduction, body, and conclusion	body of paper interrupts line of thought	Poggendorff's illusion
apply time splitter $\sqrt{2}-1$ at $(\sqrt{2}-1)T \approx 0.4\ T$ write interim report at $(4\sqrt{2}-5)T \approx 0.7\ T$ start final report	best timing schedule for (S•E), W_S cooperative effort of duration T	best determination of nuclear decay rate with random noise present

FIGURE 3. Examples of prescriptive rules obtained by metaphoric transfer. Analog: the problematic issue in Technical Writing. Source: the well-understood situation in Science and Engineering used in the assumed 'as-if' link.

Indeed, in their fuzziness our emigrants possess real gems to further technical communication. If they would only take our earlier recommendation (III) as their own (re)formator to bridge the difficult gap between the inner scientist/engineer and the inner technical communicator. Again with a bow to Zipf, the least-effort way of bridging this professional-type gap is by MT.

The Purpose of Communication our emigrants should hold to as their own and best FF. With that feedforward they can turn the worst identity crises, their own, into the prospect of new and well-balanced twin-skill personalities, their own. Metaphoric transfer then makes their good, old home grounds, their 'Europe', legislative for the new land, the Great Territory of Technical Writing and Editing, every emigrant's 'America'.

Finally a good-neighbor's care. What can the young scientists and engineers do about their future? Let's give away our very secret OCC (the Optimum Career Curve), FIGURE 4 – a Cross-Over Case.

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[1] Broer, Jan W., (1979), 'Professional Re Identification in the Writer/Scientist', Proc. 26th ITCC (Los Angeles, California), pp. W.27-W.31.

[2] Broer, Jan W., (1980), 'Feedforward, an Old Strategy for Modern Editors', Proc. FORUM '80, 2nd Intern. Conf. on Technical Communication (Lillehammer, Norway), pp. 17-23.

[3] Richards, Ivor A., (1952), 'Communication between Men: the Meaning of Language', Trans. of the Eighth Conf. on Cybernetics, Josiah Macy, Jr. Foundation (New York, New York), pp. 45-91. The other Englishman is the philosopher Whitehead (1861-1947).

[4] With the tool-bench metaphor I honor George Kingsley Zipf (1902-1950). His book *Human Behavior and the Principle of Least Effort* (1949) is an Old Testament of interdisciplinary approach. Though at times 'wild', it stimulates by the MT-type argumentation – expressed for example as a demon's economic way of chain ringing or an artisan's economic use of his tool bench – for many baffling regularities in statistical linguistics and the social field in general. Enjoy Zipf's Universal Law of word frequencies and read all his 500-odd pages!

[5] Morris, Charles W., (1946), *Signs, Language and Behavior*, Prentice-Hall (New York, New York).

[6] A fascinating field theory of communication was introduced by Bess Sondel, University of Chicago, in the late fifties. See her book (1958) *The Humanity of Words*, The World Publ. Co. (Cleveland, Ohio).

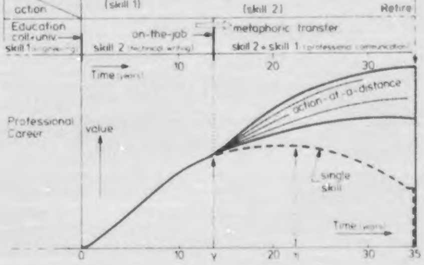
[7] Broer, Jan W., (1977), 'On Two Active-Reader Stimulants: Multiple Titles and Inverse Writing – Maximizing a Figure of Merit for Your Publication', J. Techn. Writing and Commun., Vol. 7(2), pp. 151-157.

[8] Broer, Jan. W., (1982), 'Integrating Text and Figures', in C. Harkins and D.L. Plung (eds.), *A Guide for Writing Better Technical Papers*, IEEE Press (New York, New York), pp. 179-183.

[9] The STC Code for Communicators says:
"I will satisfy the audience's need for information, not my own need for self-expression". Thus technical authors and editors make themselves the living expression against self-expression. A borderline case, yes.

[10] Broer, Jan. W., (1980), 'Breadboarding for Technical Writing?', IEEE Trans. on Prof. Commun., PC 23(2), pp. 82-84.

FIGURE 4. A twin-skill career scheme for today's engineer (or scientist). Horizontally: the total working period. Vertically: the professional-career value, it keeps increasing provided that a cross-over occurs at the bifurcation point γ. Technical writing, the stand-by skill developed on the job, then becomes the major skill with metaphoric-transfer support from the engineering skill. The point η on the dashed branch marks the beginning of negative output from the single-skill engineer.



Readability from the Perspective of Historical Linguistics: Revising for Readability as an Act of Translation

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ABSTRACT OF PAPER

This paper analyzes the effect of the Department of Defense readability formula by putting a typical sentence through a series of revisions, systematically increasing readability the equivalent of ten grade levels. Readability is next examined in the light of historical linguistics, with emphasis on the English phenomenon of synonyms at three levels. The final demonstration is an application of historical linguistics to technical communication, showing that revision for readability is comparable to foreign language translation.

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1-1. INTRODUCTION.

1-2. ARGUMENT OF THIS PAPER. This paper argues that revising technical literature for readability is like translating from one foreign language into another, a concept which should be taken into consideration when training technical writers and editors, and when constructing word and phrase substitution lists in programs such as the Navy Computerized Readability Editing System (CRES).[1]

1-3. READABILITY.

1-4. MANDATE FOR READABILITY. Paragraph 3.3.3. of Military Specification MIL-M-38784B, dated 16 April 1983 (superseding MIL-M-38784A, Amendment 5, dated 24 July 1978), states as follows:

> *Technical publications shall be written at a Reading Grade Level (RGL) commensurate with the capability of the target audience for which they are intended as specified by the acquiring activity. The appropriate RGL for each technical publication shall be determined in advance by the acquiring activity.*

1-5. MEASURING READABILITY. MIL-M-38784B does not specify how the contractor is to rewrite technical manuals to a high-school, or, depending on the manual and the service for which it is intended, a middle- or elementary-school level. The method of compliance is left to the contractor's ingenuity. MIL-M-38784B does, however, spell out in detail how readability is to be measured. A series of 200-word samples is selected according to a specified procedure, and evaluated on the basis of the following Department of Defense (DoD) readability formula:

$$RGL = 0.39\ (\text{Average Words/Sentence}) + 11.8\ (\text{Average Syllables/Word}) - 15.59$$

1-6. PRACTICAL IMPLICATIONS OF READABILITY MANDATE. The DOD readability requirements will drastically change the way that technical communications are written. Writing to a prescribed RGL will demand a sensitivity to the ratio of syllables per word and words per sentence that would be appropriate to the composition of verse. The writer or editor will have to exercise a keen feel for levels of style, and make the same decisions concerning alternate sets of vocabulary and syntax that he would make if he were translating from one language to another. Since the customer has the legal obligation to refuse any military manual written against MIL-M-38784B but not in compliance with readability, the contractor who wishes to stay in business has no alternative but to learn how to manipulate the DoD readability formula to his own advantage.[2]

1-7. HOW STYLISTIC CHANGES AFFECT READABILITY. Example (1) is a statement taken from a typical maintenance manual:

(1) Position maintenance stand adjacent to affected engine.

Syllables = 16 Syllables/Word = 2.3
Words = 7 RGL = 14.1

To demonstrate the impact that even minor stylistic changes can have on readability, example (1) will be revised seven times, with revised areas underscored. Each revision lowers the reading level by a grade or more, until the sentence is reduced from RGL 14.1 to 3.8. Example (1A) improves readability 1.5 grade levels, from RGL 14.1 to 12.6, by the insertion of one article:

(1A) Position maintenance stand adjacent to the affected engine.

Syllables = 17 Syllables/Word = 2.1
Words = 8 RGL = 12.6

Example (1B) improves readability 2.6 grade levels, from RGL 14.1 to 11.5, by the insertion of two articles:

(1B) Position the maintenance stand adjacent to the affected engine.

Syllables = 18 Syllables/Word = 2.0
Words = 9 RGL = 11.5

Example (1C) improves readability 5.2 grade levels, from RGL 14.1 to 8.9, by the insertion of two articles; and for the three-syllable word "position," substitution of the one-syllable word "place":

(1C) Place the maintenance stand adjacent to the affected engine.

Syllables = 16 Syllables/Word = 1.8
Words = 9 RGL = 8.9

Example (1D) improves readability 7.8 grade levels, from RGL 14.1 to 6.3, by the insertion of two articles; and for the three-syllable words "position" and "adjacent," substitution of the two-syllable words "place" and "next":

(1D) Place the maintenance stand next to the affected engine.

Syllables = 14 Syllables/Word = 1.6
Words = 9 RGL = 6.3

Example (1E) improves readability 9.3 grade levels, from RGL 14.1 to 4.8. The number of words in the sentence is increased from seven to eleven, of which all but three are one-syllable. This is done by the insertion of two articles; for the three-syllable words "position" and "adjacent," substitution of the two-syllables words "place" and "next"; and for the three-syllable word "affected," substitution of the phrase comprising two one-syllable words and one two-syllable word "to be serviced":

(1E) Place the maintenance stand next to the engine to be serviced.

Syllables = 15 Syllables/Word = 1.4
Words = 11 RGL = 4.8

Example (1F) improves readability 9.9 grade levels, from RGL 14.1 to 4.2. The number of words is doubled from seven to fourteen, with all but two of the words one-syllable. This is done by the insertion of two articles; for the three-syllable words "position" and "adjacent," substitution of the one-syllable words "place" and "next"; and for the three-syllable word "affected," substitution of the phrase comprising six one-syllable words "on which work must be done":

(1F) Place the maintenance stand next to the engine on which work must be done.

Syllables = 17 Syllables/Word = 1.2
Words = 14 RGL = 4.2

Example (1G) improves readability 10.3 grade levels, from RGL 14.1 to 3.8. The number of words is increased from seven to twelve, of which all but two are one-syllable. This is done by the insertion of two articles; for the three-syllable words "position" and "adjacent," substitution of the one-syllable words "place" and "next"; and for the three-syllable word "affected," substitution of the phrase comprising four one-syllable words "to be worked on":

(1G) Place the maintenance stand next to the engine to be worked on.

Syllables = 15 Syllables/Word = 1.3
Words = 12 RGL = 3.8

1-8. REWRITING TO LOWEST RGL. The ability to simplify technical language to the elementary-school level can be useful. The Overall Grade Level (OGL) of a publication is based on a series of 200-word samples. In each sample there may be sentences which cannot be simplified because they contain technical vocabulary that must be retained. In order to ensure that a given sample does not exceed the allowable RGL (which could be eighth- or ninth-grade, or lower), it is a good practice to reduce all sentences to the lowest RGL, even to the third- or fourth-grade level, if possible. No military manual will ever be rejected by the customer because it is written to a reading level that is too low.

1-9. WHY "READABLE" TEXT MAY NOT BE EASY TO READ. As a rule, the grade level is inversely proportional to the number of syllables per word. Thus in the first six revisions of example (1) above, the ratio of syllables per word decreases from 2.3 (for RGL 14.1) to 1.2 (for RGL 4.2). It is sometimes necessary to make a distinction between text that is easy to read and text that conforms to the DoD readability formula. Consider the following examples:

(2) Align dowel pin on gearbox pad with dowel pin hole on starter.

Syllables = 17 Syllables/Word = 1.4
Words = 12 RGL = 5.8

(3) Prior to performing maintenance, disconnect and temporarily ground the ignition exciter output terminals.

Syllables = 31 Syllables/Word = 2.4
Words = 13 RGL = 17.6

Example (2) has an RGL of only 5.8, as opposed to 17.6 for example (3), and ought theoretically to be three times as "readable." To the literate reader, however, example (3) is easier to read because it is better written in every respect except readability. The writer or editor must write to the formula, but at the same time he must use common sense. Readability was originally developed for use in the writing of elementary- and secondary-school textbooks. Thus the DoD version of the readability formula easily and accurately identifies the reading level of the following nursery rhyme as second grade:

(4) Mary had a little lamb,/ Its fleece was white as snow./ And everywhere that Mary went,/ The lamb was sure to go./ It followed her to school one day,/ Which was against the rule./ It made the children laugh and play/ To see a lamb at school.

Syllables = 55 *Syllables/Word = 1.2*
Words = 47 *Words/Sentence = 11.8*
Sentences = 4 *RGL = 2.8*

While technical manuals are not to be placed in the same category as children's nursery rhymes, manuals can be made easier to read, even when the subject matter is highly complex. However, easy reading is the result of slow, smart writing. As example (2) above indicates, a low RGL cannot be trusted to identify lucid writing. This is left to the writer or editor. Used in connection with the writing of military technical manuals, the DoD readability formula serves as a convenient but rough measure of textual difficulty.

1-10. READABILITY FROM THE PERSPECTIVE OF HISTORICAL LINGUISTICS.

1-11. TOWARD A SCIENTIFIC APPROACH TO READABILITY. It is possible for an exceptionally skilled writer or editor to approach the problem of creating "readable" technical communications solely on the basis of instinct and good judgment. Others, however, may find it useful to acquire a general idea of developments in the history of the English language which directly affect readability, and which therefore offer the basis for a more scientific and rational solution to various readability problems than could be acquired through the exercise of intuition alone.

1-12. "READABILITY" IN ANGLO-SAXON ENGLAND. In requiring that technical manuals be written at a level "commensurate with the capability of the target audience," MIL-M-38784B has a familiar ring. A parallel to the present situation occurred in tenth-century Anglo-Saxon England.[3] Then, as in the United States in the decade of the 1980's, there was concern regarding what was perceived as a declining educational achievement. Anglo-Saxon England in the eighth century had attained the highest level of learning and culture in Europe. By the end of the tenth century, however, it was apparent that those entrusted with safeguarding the religious establishment were less and less able to read even the basic Church documents. It was decided that "readability" would have to be increased. Scripture, sermons, and commentary could no longer be written exclusively in Latin, the language of the learned, but in what linguists now call Old English, which was the vernacular language of the Anglo-Saxon people.

1-13. THE ANGLO-SAXON SOLUTION TO "READABILITY." The Anglo-Saxon writers of English ecclesiastical prose rejected the practice so common in modern technical manuals of writing that, for example, lights "illuminate" or "extinguish" instead of "come on" or "go out." They refused to clutter their texts with Latin borrowings. Even with English grammar, Latin vocabulary would have meant that the translations were still almost as Latin as before, and this would not have addressed the problem. Instead, they created English equivalents for concepts which until then had been expressed only in Latin. Combining native elements, they coined self-explaining compounds such as Old English *agenspraec* ('own-speech') for Latin *idioma* ('idiom, one's own tongue'); or Old English *ahafenes* ('a-heavening') for Latin *elevatio* ('elevation'). Though the Anglo-Saxon scholars ushered in what literary historians of the period now refer to as the "Golden Age of Old English Prose," their motivating concern was not literary excellence, but profound distress at the decline in competence that forced them to translate Latin texts into the "lewd" vernacular, for they knew that such decline is never without serious religious, civil, and military implications.

1-14. NORMAN FRENCH BECOMES OFFICIAL LANGUAGE OF ENGLAND. In the year 1066 the Anglo-Saxons paid the price for negligence, for with the Norman Conquest of England the Anglo-Saxon era was abruptly terminated. Almost overnight the Anglo-Saxons became a subservient people, and the English language was relegated to lowest status. The literary as well as official language of England was now Norman French. Latin, the learned language, was restored to ecclesiastical use, since the Norman French, unlike the Anglo-Saxons, had never lost their proficiency in Latin.

1-15. ENGLISH REEMERGES AS OFFICIAL LANGUAGE OF ENGLAND. It took nearly two centuries for English to reemerge at all levels as the official language of England. By then, however, the English language had been transformed almost beyond recognition, for the linguistic impact of the Norman Conquest was far-reaching and permanent, particularly in the area of vocabulary.

1-16. THREE LEVELS OF DISCOURSE IN ENGLISH. English was now characterized by the presence of three categories of synonyms, creating three distinct "levels of discourse." The first level is the POPULAR level, which comprises the native Germanic vocabulary of Anglo-Saxon English. The second is the LITERARY level, which comprises the Norman French vocabulary. The third is the LEARNED level, which comprises the Latin vocabulary.[4]

1-17. CHARACTERISTICS OF LEVELS OF DISCOURSE. The differing characteristics of vocabulary at the POPULAR, LITERARY, and LEARNED levels are evident if examples of synonyms are grouped in sets according to etymological origin, in the order Anglo-Saxon English, Norman French, and Latin respectively:

ape--copy--imitate
ask-question--interrogate
do--perform--accomplish
fear--terror--trepidation
fire--flame--conflagration
folk--people--population
food-victual--provision
lift--raise--elevate
light--shine--illuminate
look--glance--scrutinize
meet--repair--satisfy
make--fashion--fabricate
mend--repair--rectify
put--place--position
say--proclaim--annunciate
stab--pierce--penetrate
show--display--exhibit

smell--odor--aroma
speak--converse--communicate
swerve--depart--deviate
take--seize--confiscate
tell--explain--elucidate
think--ponder--cogitate
walk--amble--perambulate
watch--observe--monitor

For the technical writer or editor attempting to comply with readability requirements, the crucial distinction between levels of discourse is not stylistic (however striking this may be), but syllabic. As a rule, the POPULAR, or Anglo-Saxon English, synonym comprises one syllable; the LITERARY, or Norman-French, synonym one or two syllables; and the LEARNED, or Latin, synonym three or four syllables. Since readability requires that the ratio of words to syllables be carefully controlled, some knowledge of the phenomenon of levels of discourse in English is of great practical importance.

1-18. **REVISING FOR READABILITY AS AN ACT OF TRANSLATION.** To appreciate how levels of discourse affect readability, and present problems similar to those that confront the translator from one language to another, consider example (5), taken from the introduction to a checklist:

(5) This checklist is a step-by-step guide in abbreviated form for use as a reference to ensure accomplishment of selected tasks by a predetermined sequence procedure.

Syllables = 46 *Syllables/Word = 1.8*
Words = 25 *RGL = 15.9*

Eight words in the sentence are of Latin origin:

abbreviated
accomplishment
form
predetermined
procedure
reference
selected
sequence

Five words are of Norman-French origin:

check-
ensure
guide
tasks
use

Fifteen words are of Anglo-Saxon English origin:

a
a
a
as
by
-by-
for
in
is
-list
of
step-
-step
this
to

For RGL computation, example (5) contains 25 words, for "step-by-step" must be construed as a three-syllable word, and "checklist" as a two-syllable word. For purposes of vocabulary analysis, the sentence contains the equivalent of 28 words, with "step-by-step" three words and "checklist" two. Thus, out of an equivalent vocabulary of 28 words, 28.5 percent is of Latin origin, 18 percent of Norman-French origin, and 53.5 percent Anglo-Saxon English origin. Analyzed syllabically, however, the figures are more revealing. Out of 46 syllables, 54 percent represents words of Latin origin, 13 percent Norman-French origin, and 33 percent Anglo-Saxon English origin. The abundance of Latinate diction boosts the RGL to 15.9. To comply with readability, the sentence needs to be revised. The revision strategy is to reduce the percentage of Latinate diction and increase the percentage of Anglo-Saxon English diction, or, to put it another way, to translate from the predominately LEARNED level of discourse to the predominately POPULAR:

(5A) This checklist is a step-by-step guide to tasks that must be done in a set order.

Syllables = 20 *Syllables/Word = 1.3*
Words = 16 *RGL = 5.4*

In this instance it is possible to eliminate words of Latin origin entirely. The nonnative vocabulary can be limited to the following Norman-French words:

check-
guide
tasks
order

The diction of the revised sentence, example (5A), is now 21 percent Norman-French origin and 79 percent Anglo-Saxon English origin. The RGL has dropped 10.5 grade levels, from 15.9 to 5.4. Seen in the light of historical linguistics, with particular reference to the phenomenon of levels of discourse, the revision of example (5A) can be understood as the equivalent of an act of translation from one language to another.

1-19. **NOTES.**

[1] J. P. Kincaid, J. A. Aagard, and J. W. O'Hara, *Development and Test of a Computer Readability Editing System (CRES)*, TAEG Report No. 83, Training Analysis and Evaluation Group (Orlando, FL 32813), 1980; J. P. Kincaid, L. K. Cottrell, J. A. Aagard, and P. Risley, *Implementing the Computer Readability Editing System (CRES)*, TAEG Report No. 98, Training Analysis and Evaluation Group (Orlando, FL 32813), 1981; and J. P. Kincaid, J. A. Aagard, J. W. O'Hara, and L. K. Cottrell, "Computer Readability Editing System," *IEEE Transactions on Professional Communications*, 24 (March 1981), 38-41.

[2] For an earlier warning, see J. D. Kniffin, "The New Readability Requirements for Military Technical Manuals," *Technical Communication*, 26 (Third Quarter 1979), 16-19.

[3] See Albert C. Baugh, *A History of the English Language*, 2nd ed. (London, 1965); and Kemp Malone, "Old English Period (to 1100)," *A Literary History of England*, ed. Albert C. Baugh (New York, 1948), pp. 96-106.

[4] For a good discussion, see Baugh, *A History of the English Language*.

Using Computers in the Technical Communication Classroom

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The use of personal computers and word processors to create, store, and distribute documents is becoming more and more widespread in the workplace and in colleges and universities. As a result of technological advances, some adaptations will be required in technical communication courses. What effect will the computer have on the teaching of technical communication? What new instruction will be required? What specialized, computer-related courses will be needed? How can the new technology be used as a tool to teach composition? What are the advantages of word processing for the student? For the instructor? What are the disadvantages? What are the effects on productivity? On quality? Should word processing skill or computer literacy be a requirement for technical communication students? These are some of the questions which the members of this panel address.

In exploring the role of the computer in the technical communication class, panel members provide information useful to those who design and teach courses in academic and corporate settings.

First, Janet Potvin presents the results of a project intended to introduce students in a professional writing course simultaneously to the proposal process and to automated communication systems. Teams of four students prepared formal research proposals for a study of the effect of communications technology on the composing processes of student writers. Each proposal team was given project guidelines, a research prospectus, and grant application forms. As part of the project, students organized a project team, completed a literature search, detemined a method of approach, determined key themes and strategies, and prepared a formal proposal. Proposals were evaluated by the instructor; the project was evaluated by students using a standardized questionnaire. Results of the project and the students' evaluations were favorable. Students gained a greater awareness of the impact of technology on technical and professional communication at the same time that they gained understanding of the proposal process.

Next, Doann Houghton-Alico presents a model program for developing a course on writing computer software documentation. Today's computer users are no longer solely trained computer experts or trained data entry staff -- they may be senior executives, secretaries, student interns, or staff accounts -- literally anyone. Because of the changing user profile and the increasing demand for effective software documentation in the 1980s, there is increasing demand for software documentation writers. While some writers will come from industry and some from industry training seminars, eventually colleges and universities will be required to provide courses in writing software documentation. Ms. Houghton-Alico details the course development planning process as well as a project management methodology that provides an attitude of orientation for creating documentation. She discusses the curriculum, and teaching strategies and materials for COM 390, a college-level course in writing computer software documentation which she has developed at Metropolitan State College in Denver, Colorado.

Next, Carolyn Mullins discusses the use of word processing as a tool to enhance writing instruction. From her experiences using word processing to teach students at Virginia Tech, she finds that word processing eliminates much of the drudgery of writing and revising, making it possible for teachers to require multiple drafts of papers. Students can use freewriting, letter and journal writing, and nonstops to help cure writer's block; they can produce first drafts quickly from reader's cards; and they can use aids such as block move and copy, insert and delete, string check and change, global search, and spelling checkers to learn both the techniques and the benefits of careful revision. The ease of making corrections encourages revision. Students benefit from computer assistance by being able to concentrate on the substance of revision without worry over production of the document. While all students can benefit from the use of word processing it is of greatest benefit to the more advanced student.

Last, John Stibravy and Charles Beck discuss the impact of word processing on quality, based on their interviews of forty logistics graduate students at the Air Force Institute of Technology who had recently begun using word processors. The officers provided insight into three areas: time, quality, and attitude. They describe four areas in which the officers felt that the use of word processors saved time; six areas that resulted in improved quality; and five areas in which the word processor favorably influenced attitude. While the use of word processing resulted in savings of time and several officers noted that the ease of preparation allowed them to improve papers when formerly they did not take the time to do so, the authors caution that the use of word processing alone does not result in quality. The time saved may or may not be applied to improving quality thought. Despite technological advances and improved methods of production, the achievement of quality rests with the thought processes of the writer.

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'...prepare a proposal for a study of....' Introducing Students to Automated Communication Systems while Teaching Proposal and Grant Writing Strategy

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This paper describes an experimental project used to introduce students in an advanced professional writing course at The University of Texas at Arlington simultaneously to the proposal process and to automated communication systems. Teams of four students prepared formal research proposals for a study of the effect of communications technology on the composing processes of student writers. The experimental project enabled students to gain a greater awareness of the impact of technology on technical and professional communication; better understand the proposal process; better conceptualize research problems; and improve problem-solving, planning, organization, management, and communication skills.

INTRODUCTION

Instruction in writing proposals and grants is becoming an increasingly important component of today's technical and professional communication courses, particularly advanced courses. At the same time, knowledge of the use of word processing, text editing, and telecommunications systems to compose, produce, and transmit documents is becoming essential. As several recent articles ([1-5], for example) have indicated, the 1980s has indeed become "the decade of personal computers, communicating word processors, and electronic information networks." Scientists, engineers, managers, writers, and editors who prepare documents must understand and learn to make use of the available technological tools to increase their productivity and effectiveness, yet not all colleges and universities have word processing, text editing, or computerized writing laboratories available for introducing students to the new technology. This paper describes an alternative: an experimental team-writing proposal project on a topic intended to introduce students in an advanced professional communication course at The University of Texas at Arlington simultaneously to the proposal process and to automated communication systems.

The paper begins with background information and a brief description of the course, then describes the experimental project. Results of the project and the students' evaluation of it are then presented, followed by a discussion of the approach. The paper concludes with suggestions to aid those planning similar projects.

BACKGROUND

At The University of Texas at Arlington we offer both an advanced technical writing course sequence (English 4340, 4341) and an advanced professional and business writing sequence (English 4350, 4351). Although part of our undergraduate writing minor, the courses are open to students in all disciplines. Proposal and grant writing is covered in the second course of both the technical and the professional writing sequence (English 4341, 4351) since the courses are intended for, and attract, different audiences. The project described here was developed in English 4351, the professional writing course, but is applicable for advanced technical communication courses.

English 4351--Professional and Business Writing II--places major emphasis on report and proposal strategies. The course is process-based and project-oriented; the writing assignments draw upon a case approach as well as upon simulation of the writing requirements of business and industry. Topics include communication theory; a review of basic principles of business communication; audience and purpose analysis; style and readability; research methods and project design; literature searching (including computerized bibliographic searching); visual presentation and graphic design; persuasive strategies; and short and long reports; preproposal letters; and proposals and grants (informal, formal; solicited, unsolicited; commercial, government, foundation). Special topics include the impact of automation on technical and professional communication, legal aspects of professional communication, and intercultural communication. Students write, edit, and design both short and long reports and proposals. Major assignments include two short reports (one individually written; one team-written using a case approach); a conventional formal report project on a topic of current interest in the student's major field; and two proposals, one a short proposal (working plan) in letter form for the formal report project and one a long formal proposal. In addition, students do a series of short assignments using cases and write evaluations of proposals and reports. Assignments in the course are arranged in order of progressive difficulty as well as in keeping with the reporting requirements of a project in business, government, or industry.

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*At the time the paper was written, the author was Assistant Professor of English and Director of Technical Writing at The University of Texas at Arlington.

The students who have enrolled in the course have represented a range of disciplines, as in our introductory and advanced technical communication courses.

AN EXPERIMENTAL PROPOSAL WRITING PROJECT

As an experimental project in English 4351 last spring, students were asked to prepare the formal proposal assignment for the course as a team-written effort for a study of the effect of communications technology on the composing processes of student technical and business writers. At present The University of Texas at Arlington does not have a word processing, text editing, or computerized writing laboratory. The intent of the assignment was to introduce students to the new technologies and composition tools that would be available to them in their careers and to give them an opportunity to work on an actual research project at the same time they were learning proposal strategy. A research emphasis was given the topic to expand the scope of the project beyond that of a feasibility study for a word processing laboratory. Although students had done computer searches earlier in the course and two students had made use of the IBM Wylbur system to prepare assignments, most were not familiar with the new communication systems being used in industry to compose, generate, and disseminate documents, nor were they aware of the potential effect of automation on the future of technical and professional communication.

Methods

The class of 12 students was divided into three groups of four students each. Each proposal team was given detailed guidelines for the assignment, a research prospectus, and grant application forms. A collection of articles related to the subject was made available as background information.

For the project students organized their project team, divided responsibility for the project, determined a tentative proposal plan and method of approach for the project; identified needed sources of information; prepared a bibliography; located resources; collected and analyzed information; determined key themes and capture strategy for the proposal; then drafted, edited, revised, and produced a formal proposal. Students were given four weeks to complete the project.

It was recommended that each group select a project leader; however, the structure of the assignment was flexible and each group was given freedom to organize the project and to develop their strategy and their proposal. Students were told that each member of a group would receive the group grade for the project. Consultation was available to each group equally, and a portion of each class (usually the last 10 minutes of an hour and a half session) was set aside for questions and discussion of the project.

In conjunction with the study of proposal writing, students read The Winning Proposal by Holtz and Schmidt [6] as well as a selection of articles placed on reserve in the library. Students also received a bibliography on grant writing. Proposals were evaluated by the instructor; the experimental project was evaluated by the students using a standardized questionnaire.

Results

Each team produced and submitted on time a formal proposal for a study of communications technology on the composing processes of student business and technical writers. The proposals included plans for gaining working knowledge of the use of word processing systems to generate documents in business, government, industry, and the sciences; identifying available systems and selecting a suitable system for a university word processing/text editing/writing laboratory; studying the composing processes of student writers; implementing instruction in the use of word processing/text editing systems to create and produce documents; studying the effect of communications technology on the composing process; and evaluating the results of the proposed approach to the problem. Students made different assumptions about the nature of the project, and the resulting proposals, research methodologies, and capture strategies differed significantly. The approaches were innovative and simulated the strategies that would be used if the documents were actually to be submitted to an agency for review. With one exception, the proposals represented the results of careful team effort in analyzing a problem; evaluating alternative solutions; selecting a method of approach; dividing responsibility for research, writing, editing, and production; and implementing the plans made. The overall results of the project were favorable as were the students' evaluations.

In their comments, the students indicated that the project was an important learning experience and should be a part of future courses. Several students commented that the project was the most difficult but the most challenging one on which they had ever worked. Students noted several advantages of the project: it allowed them to apply group problem-solving techniques; to make use of others' expertise in areas where they themselves were weak; and to tackle a challenging problem. They also noted some difficulties: not all students were team persons; not all team members were willing to put forth the level of effort required to achieve the group's goals (an A for the project); not all students were reliable; that some students lacked interpersonal skills; and that logistics were sometimes difficult because of team members' differing class, work, and social schedules. In response to a question about modifications that they might recommend in the project, students suggested allowing individuals to form their own groups and allowing more time for the project. Several students indicated that more time for the project would have been beneficial. Two groups found production of the document to be far more time-consuming than they had anticipated, with the result that meeting the deadline was extremely difficult (one group typed their proposal; the other used a computerized text processing system).

Discussion

The experimental team project described here was developed for several reasons:

- A desire to simulate a real-world writing situation (rarely are formal proposals written by individuals; generally they are prepared by teams of investigators, often under the direction of or in concert with professional proposal writers and editors);
- A desire to teach students the overall process of proposal development (preliminary preparation; analysis of the requirements; formulation of an approach, a theme, and a capture strategy; and implementation of the approach--writing, design, review, revision, and submittal);
- A desire to involve students in an actual research project related to technical and professional communication (consideration of the impact of automation on the composing and revising processes of both professional and students writers is of research interest); and
- A desire to introduce students to the automated communications systems now being used in business and industry.

Although there are known difficulties with team projects, they are also known to teach many of the skills important in proposal writing: problem-solving; planning; organization and management; budgeting; scheduling; and oral, written, and inter-personal communication skills.

The grouping of students resulted in a diversity of disciplines on each team, as well as a range of leadership abilities, familiarity with computer systems, and communication skills. Disciplines represented in the groups were as follows: Group 1--communication (public relations option), speech-communication, management; and systems analysis; Group 2--industrial engineering, speech-communication (2), and finance; and Group 3--computer science and engineering, English (2), and speech-communication. One of the English majors had extensive background in accounting; the other had recently changed majors from geology to English. All but one student participated in the project enthusiastically, and the groups generally worked well together, although one group had considerable difficulty in settling on an approach to the problem and in pooling their efforts to produce a "team" proposal.

The choice of an actual research topic for the team project proved interesting and challenging to the students, and their efforts far exceeded those for a standard assignment. The project generated a great deal of interest in the topic, particularly automation in the workplace, including the request for a site visit to a company or companies where automated communication systems were being used on a large scale. As a result of the project, students learned about proposal writing (process, product, politics, and strategy); about the logistics of working on teams; and about changes taking place in the way documents are composed and produced in business and industry.

PLANNING FOR SUCCESSFUL TEAM PROPOSAL PROJECTS

Careful planning is essential if team projects are to be successful. Consideration must be given to selecting a topic, preparing a research prospectus, establishing the nature of and guidelines for the project, forming project groups, evaluating students' performance, and anticipating contingencies. Some suggestions to aid in planning follow.

Selecting a Topic

The instructor should select a topic that is both accessible to all members of the class and on which he/she has a detailed working knowledge in order to guide students through the project successfully.

If students do a formal report project on a topic of interest in their major field as a first major project in the course, a topic related to technical or professional communication is a good choice.

Preparing a Research Prospectus

A research prospectus which summarizes briefly the present state of research on the topic chosen is helpful for students, particularly if students have limited time to develop a bibliography and read for background knowledge before they begin planning proposal and project strategy. Depending upon the extent and emphasis of the proposal project, the prospectus can also include keywords to help students shape a literature search, possible research objectives, and probable elements to be included in the research design. The prospectus should help students pursue logical avenues of inquiry, not rigidly structure a proposal plan.

Establishing Project Guidelines

The boundaries of the assignment must be carefully delimited and detailed guidelines must be developed for the project. For example, is the proposal to be a solicited or unsolicited one? If unsolicited, what agencies are likely to fund the proposed project? Are students to determine potential funding sources as part of the project, or is the instructor to provide this information? For what agency is the grant to be prepared? What guidelines are available/will be used for preparing the document? How much of the decision making will the students be required to do? How many drafts of the proposal will be required? Will a review cycle be included as part of the assignment? Will the teams compete? Will students (or the instructor) actually submit the grants prepared? How will grading be done? Will proposals be evaluated by peers, by the instructor, or by both? What evaluation criteria will be used? What weight will the respective evaluations have? What percentage of the course grade will the project constitute? How much time will be allocated to the project?

As a note, in the experimental project described above, proposals were evaluated solely by the instructor since the proposal was due at the time of the final examination for the course. Each student received the group grade for the project. A better system may be a combination of peer and instructor grading [7] or perhaps a combination of instructor, peer, and student self-evaluation [8] where both individual and team effort are recognized. If the group grade is averaged with students' self-perceptions of their performance and the instructor's assessment of their performance in the group, a more realistic evaluation of individual effort is afforded, but the impetus for team effort may be diminished.

The determination of the duration of the project is also an important consideration. Students need to understand the constraints of the proposal writing situation in which quality of the product and the amount of available time to perfect the product must be carefully balanced. At the same time students must have a reasonable amount of time to accomplish the project.

Forming Project Groups

The dynamics of grouping is also an element to be considered. Groups must be small enough so that each member has an opportunity to take an active role.

Anticipating Contingencies

Finally, it is helpful to be aware of the known difficulties of team projects before beginning. Not all persons are team persons: Some are extremely competitive and have difficulty working with others; some are irresponsible and fail to complete their part of the assignment even though they agree to do so. Also, some are unwilling to expend the level of effort the group's goals require. It is important that both group members and the instructor determine prior to the beginning of the project how to handle the student who refuses to participate in the group or who simply fails to contribute to the project in any way [9].

Summary

By selecting a research project about which the instructor is knowledgeable and to which the students in the class as a whole can relate, by structuring the groups so that each student has a significant role to play, and by providing detailed guidelines at the outset of the project and consultation and guidance as needed during the project, it is possible to develop and manage successful team proposal projects in technical and professional communication courses. Although considerable planning is required, the results are rewarding for both students and the instructor.

CONCLUSION

Having students prepare team-written proposals helps them to gain an understanding of the proposal process, to conceptualize research problems, to interact with an inter- or cross-disciplinary team, and to gain experience with organizing and carrying out team writing projects. Team projects also help students to enhance their problem-solving, planning, organization, scheduling, and management skills, and to improve their written, oral, and interpersonal communication skills. In the experimental project, students not only learned something of proposal strategy, but something about word processing and the impact of automation on technical and professional communication as well.

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A Model Program for Developing and Implementing a Course on Creating Computer Software User Documentation

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There is a defined need to create effective computer user documentation; that need will grow radically during this decade. To meet this need, there will have to be trained documentation writers. Where will they come from? One response is university technical communications programs. This paper describes the course development process, curriculum, and teaching strategies and materials for COM390-Creating Computer Software User Documentation, taught by the author at Metropolitan State College, Denver, Colorado. One important concept in the teaching strategy was to have the classroom resemble the professional world. Students were divided into project teams to complete actual documentation projects.

I. INTRODUCTION AND IDENTIFICATION OF THE PROBLEM

The title refers to making history, but before we document that, let us look at the "prehistoric" era. The computer software industry has its roots in the mid-1950s with the development of high-level programming languages. In those days, it was a close contest among the big companies--such as Remington Rand Univac, IBM, and Burroughs--to see who would be the first with the next discovery.

Fortran was the first high-level computer language and was developed by John Backus and colleagues at IBM. Another major step was the development of Flow-Matic by Grace Hopper at Remington Rand Univac. This was the first programming language resembling English and was used to develop Cobol. The use of these languages permitted major evolutionary steps in the concepts and use of computers.

In 1968, NATO sponsored the first conference on software engineering, a term meant to bring some discipline and order to a chaotic field. In the 1970s, the American National Standards Institute (ANSI) entered the scene with information processing standards. Although used on a voluntary basis, ANSI standards provide a framework for shared codes, languages, and formats.

The infancy of software was an exciting and challenging time, and the "personality" of the industry was established. But the next dramatic impact on the industry was a hardware development--the silicon chip and the introduction of microprocessors. This changed the industry so radically that today there are hundreds (possibly thousands if one counts individual entrepreneurs) of companies producing software packages. Like many new industries in the first few years--the late 1970s--no one could go wrong. Sales were high; production was fast. It was as if King Midas was every company's chief executive officer.

Nevertheless, the software industry has changed radically in the past two years. Users are becoming more discriminatory, the recession has had its effect, sloppy programming and inadequate documentation are being recognized for what they are. But the primary change is the user profile.

Last fall, my company, TIA, conducted a market study and analysis for a California-based publisher interested in the documentation industry. The literature search and the interviews with software documentation experts indicated strongly that the area of software documentation was in trouble, needed all the help it could get, and was emerging as a key issue in a product's marketability.

Some of the conclusions of the TIA study that impact documentation include the following:

- o Increased use of the personal computer in office automation;
- o Growth of independent software distribution companies;
- o Use of third-party authors for creating software;
- o Beginning of a change in attitude by software industry management about the importance of documentation;
- o Increase in interactive systems and on-line user guides.

This background information points in one direction: there is a defined need to create effective computer software user documentation; and that need will grow radically during this decade. In order to meet this need, there will have to be trained documentation writers. Where will they come from? Industry? Certainly a few will. Documentation specialists are learning by the "seat-of-the-pants" method now, and some of them have managed to come up with procedures, standards, and techniques that work; but surprisingly few, to judge from the quality of user documentation that exists today. Industry training seminars? Again, a few. But there are only a handful of training programs, they are expensive, and they do not necessarily have the right curriculum. Colleges and universities? Not yet, but if they do not gear up to serve this need, they are neglecting an important responsibility.

II. INTRODUCING COM390

COM390-Writing Computer User Documentation first was offered by the Department of Industrial Communications, Metropolitan State College, Denver, Colorado during the summer session of 1983. As far as we could determine, it was the first college-credit course on this subject. Professor J.O. Yunker, chair of the Industrial Communications Department instituted the new course because, "It's a job that has to be done. Companies need documentation specialists, and if we train them, that means we can place students in jobs."

Richard Fontera, President of Metropolitan State College, wrote in the Rocky Mountain Business Journal (1/31/83), "Business and education must come together for the long haul....The aim of the new partnership must be to both identify and mutually act upon a clear recognition of our overlapping futures."

I was selected to teach COM390 by Professor Yunker specifically because of my practical experience. Even the full-time faculty in the Industrial Communications Department must have at least six years of work experience in the field in which they are teaching. This is not an "ivory tower" department, but rather, as Professor Yunker says, "We're a hands-on group." The emphasis on practical experience is particularly essential in a field such as computer software documentation, which is new and continually evolving.

I am president of Technical Information Associates, Inc., a Denver-based corporation. TIA is a pioneer in the development of software documentation methodology. TIA provides complete documentation services, software user needs assessment, development of specifications, and training. We have completed a variety of work in the documentation field—from training programmers to write interactive display screens to writing and producing user manuals on programs ranging from property management to heavy equipment inventory; we have worked with software for micros, minis, and mainframes.

I describe TIA's work because it was invaluable in developing the course and providing a foundation for my teaching strategy. My book, Creating Computer Software User Guides: From Manuals to Menus, published by McGraw-Hill and about to be released, was used in establishing the course content. There is no other text to date that covers the same material.

III. COURSE DEVELOPMENT PLAN

Many of us have learned and taught the importance of developing a "thesis statement" as a first step for creating written documents. In developing this course curriculum, I developed the "thesis question." The answers to this question assisted me in listing the intended learning outcomes for the course, which in turn led me to a logical course structure. Try this as a thesis question for a course in developing software user documentation: "What are the procedures and techniques necessary for creating effective software user documentation?"

I used the following process to develop course objectives and specific course units:

1. Define effective user documentation;
2. Brainstorm a list of procedures and techniques necessary for creating effective user documentation;
3. Review and refine the list, categorize by skills or concepts;
4. Prioritize the revised and categorized list;
5. Write clear intended learning outcomes for each item on the revised list;
6. Draw a graphic representation (map) of the intended learning outcomes in terms of their priorities and their relationship to each other;
7. Use the map to plan the course units and their logical order.

Out of the map and course units, the teaching strategies are derived, which are used to implement the course itself. Upon completion of the course, the students and instructor evaluate the content and presentation, which is used to refine the thesis question, and the process begins again for the second course.

The concept of intended learning outcomes is from Posner, George and Alan Rudnitsky, Course Design: A Guide to Curriculum Development for Teachers, New York: Longman Inc.; 1978.

IV. COURSE CURRICULUM

Rules and standards for creating documentation cannot be static because of the diversity of documentation presentations and formats and the continuous evolution of computer software, hardware, and firmware. Nevertheless, a project management methodology can be developed that provides an attitude of orientation for creating documentation under any conditions. This concept was the key point in the development of COM390.

The methodology must be flexible enough to incorporate changes in technology, presentation, content, and educational approach, yet provide guidelines to ensure the effectiveness of the documentation. How can these dual goals be accomplished? The answer lies in combining a macro and micro task orientation.

When building a house, the first step is to determine what the owner wants; this is followed by rough sketches and further definition of needs, which are refined to a detailed blueprint. This final design provides the basis for all that follows. The macro design plays the same role in documentation. The micro frame brings that design into visual reality. It provides the specifics—such as research, writing, and editing—that result in a final product, just as the carpentry, electrical work, and plumbing contribute to a finished home.

The key to the macro design is a use analysis, which serves to define the scope of the project. The elements that make up the macro design for a documentation project are as follows:

1. Use analysis;
2. User profile;
3. Project definition;
4. Preliminary documentation organization;
5. Resource parameters;
6. Project management plan.

The elements of the micro frame are the following:

1. Research;
2. Writing;
3. Graphics;
4. Editing;
5. Production.

For the purposes of this paper, I define effective user documentation as information presented in a media appropriate to the conditions under which it will be used that provide the software user with adequate information to achieve the goals of the software system without experiencing undue stress. Several variables are introduced in that definition, which, perhaps, add undue stress to the documentation specialist. But not if he or she has completed our course.

The course units for COM390 included the following

1. Brief history of computer industry development, software types;
2. Documentation types (technical or development documentation, product documentation, and user guides), content, and criteria for use;
3. Description of project management approach and how to conduct a use analysis and user profile;
4. Establishing project goals, preliminary content organization, resource parameters, and a project management plan;
5. Research, including tricks for reading a variety of programming languages, interviewing technical staff, and managing research data [Note that in terms of documentation, computer languages are not very important; they only enter the picture if a documentation specialist has to obtain some research information directly from the source code, which is infrequent];
6. Writing text including styles and formats;
7. Selecting and creating graphics;
8. Creating on-line interactive user guides;
9. Editing;
10. Production;
11. Distribution and maintenance.

The most important outcome, which in effect was the teaching strategy for supporting most of the intended learning outcomes, was a written documentation manual for a defined audience produced by the class. The first class wrote "No Sweat QEDIT: A Quick and Easy Guide for the New User." QEDIT is a utility program for the HP3000 minicomputer that enables programmers to edit programs which they are writing. At Metro, programming students have only one hour at a time on a terminal. They do not learn QEDIT in their programming classes, yet they need the basics of it to write their programs. I had several programming students in my first class, and they were most eager to create this manual. It is very short and gives just enough information for a programming student to edit his or her code. It has been received ecstatically by its targeted audience. What more can you ask?

The second class is producing targeted user guides for students, faculty, and staff who are learning to use the word processing program that accompanies the new IBM PC in the School of Professional Studies at Metro.

V. TEACHING STRATEGIES AND MATERIALS

The most important requirement is a computer and a software program to document. As discussed, designing a manual for a target audience that needs the information is ideal. If such a situation can not be arranged, at least assign a project that has some practical outcome. In addition, lab time for the students to use the computer to learn enough about the program to document it and to use word processors or typewriters for producing final copy is essential. Class time should not be used for this work.

Important common aspects of the two documentation projects I have used of date are the following:

1. They are real, that is they serve an existing purpose, they are not "busy" work.
2. They meet the needs of specific users.
3. A project management approach was used to create them.

In other words, in courses like this, you can not teach certain concepts—such as a project management approach and a user needs assessment--and then not use those very concepts in the class work. The classroom must resemble the outside professional world as much as possible.

The class was divided into four project teams, with each team responsible for various aspects of the manual being produced. Each team designed their own management systems and management plan components and presented reports to the class on their decisions and progress. Short written assignments were submitted in memo form. Representatives from the software industry were invited to address the class as a panel during one session followed by discussion and questions and answers. These are just some of the techniques that were used to reenforce the professional world atmosphere and structure of the course.

No prerequisites were required. The point was to attract part-time students as well as full-time students pursuing related degrees. This did present some problems in terms of teaching strategies. Nevertheless, the mix of professionals (primarily programmers and technical writers) contributed to the success of the course. I recommend not using prerequisites, but compensating either through written materials, suggested outside readings, or intensive workshops for students who need to increase their skills.

Students may be lacking in two primary areas: writing skills and computer literacy. There is so much material to cover in the course itself, you can not start at the beginning in these areas also. I recommended William Zinsser's On Writing Well, New York: Harper and Row; 1980, for my first class and required it for my second class. I also suggested The Chicago Manual of Style as a reference book and additional reading, such as Strunk and White, The Elements of Style and various technical writing textbooks. In spite of the ballyhoo about several computer books for the layperson, I have yet to find one that I can recommend. Rather, I distributed selected articles and some of my own work to bridge the computer gap for those students who needed it. In addition to information from my own book, I used copies of articles from the current computer trade press. I believe that this is essential in keeping the course up-to-date.

Each student was asked to fill out a questionnaire at the beginning of the course. This helped in establishing the project teams. I tried to get a mix of part-time and full-time students, males and females, vocal and quiet students, computer users and noncomputer users in each group. Students were not assigned to the project teams until the end of the second week of class. I recommend following this procedure, because by then you have an idea who is staying in the class and something of the characteristics of each student.

Students were expected to attend all meetings of the class. Participation in class discussion was included in grading. Both the quality and quantity of each student's particpation in the team project was evaluated. In addition, each member of the project teams evaluated the other members of his or her team.

Two one-hour examinations were used. I did not want to use excessive time for examinations, nor did I feel that in this type of a course should testing play a major role. The emphasis was on performance in class and in terms of production of the manuals. Each test contained at least one open-ended question, which required the student to develop an opinion and define or implement it in some way. Two examples follow: (1) What do you think is the most important point in creating effective user documentation and describe briefly how you would implement that idea in a company in which you are a documentation writer, and (2) Based on the readings passed out in class and/or the comments of our guest panelists, what do you think are the major problems with user documentation today? Include the reasons for your analysis.

Short individual research assignments were used, and each student presented his or her research data to the entire class. For example, each student was assigned a specific programming language and gave a brief report on its development, use, and logic with samples. Also, each student designed a graphic presentation for use in a user manual unlike the one being created in class. These were copied and distributed to the entire class. Students were encouraged also to bring in examples of documentation from their work or their personal experience, and critique them, or, if it was documentation that they were writing in connection with their work, ask the class for suggestions. Several students took advantage of this, which added to the class's exposure to a variety of documentation and documentation problems.

Lecture, discussion, class exercises, and the use of audio-visual materials are all appropriate for this course. Use the following process guidelines for introducing concepts and skills:

1. Describe the concept in words, amplify with graphics (e.g., a diagram drawn on the blackboard or presented on an overhead);
2. Present concrete, real-world examples of the concept;
3. Initiate a discussion about it, ask leading questions, then keep quiet, unless the students get off the subject or one person dominates the discussion;
4. Give exercises, either in class or as assignments, that enable the students to use the concept or practice the skill;
5. Evaluate the practice work;
6. Demonstrate how the concept or skill fits into the larger picture, bring it up whenever appropriate throughout the rest of the course in a manner that is identifiable to the students;
7. Test the students' comprehension either through class discussion, tests, project work, or assignments;
8. Review as necessary.

In a course of this nature, you must expect adult students. I refer not just to students who might be over 21, but to those who have full-time work experience, possibly even one or two degrees. Such students expect results. They can not afford to waste time; they want to leave each class feeling they have learned something useful. At the same time, they may not be psychologically prepared for tests, they may not know how to study, they may feel self-conscious about expressing themselves in front of what they consider to be "professional" students—students who know the ropes, so to speak. These generalizations are derived from my own experience as well as several texts on adult learning, such as Teaching Techniques in Adult Learning, ed. by Michael D. Stephens and Gordon W. Roderick, David and Charles, London, 1971 and 1974. As an instructor you can give suggestions on the process of learning as well as the content. Ensure that course goals and your expectations are clearly defined and allow ample time for the completion of outside assignments.

Evaluation is a necessary part of the teaching/training loop. In addition to the evaluation of their fellow project team members, each student evaluated the course and the instructor's ability to meet the defined course goal and objectives. This type of feedback provides suggestions for improvements and keeps the instructor "honest." By honest, I mean on target with the goals and intended learning outcomes that have been defined through the logical and thoughtful process described earlier in this paper.

Evaluation brings us full circle to our starting point. For the second course, we use that evaluation as data in developing and refining the course structure.

In closing, bear in mind this story. A citizen task force studying transportation in a midwestern city went to Los Angeles to look at what then was considered the state-of-the-art in transportation systems. They returned and reported, "We have seen the future, and it doesn't work." The challenge to the computer industry is to prevent that attitude from developing about computers. Computer literacy is the term that's been coined to describe our ability to use computers, and it will be a key factor in coping with the future. The major contributor to computer literacy is software documentation. And the major contributor to preparing people to write software documentation is our colleges and universities.

Word Processing in the Technical Writing Classroom

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ABSTRACT

Using word processing enables students to discover, many for the first time, both the joys and the power of careful revision. Freewriting, journal and letter writing, and nonstops, aided by word wrap, help to cure writer's block. Rapidly typed drafts with no worry about errors help writers to produce that first draft. Global search and replace help to correct overuse of the verb "to be," wordy phrases, excess technical language, and the like. Grammar and spelling checkers and hyphen help prevent or correct errors while teaching proper forms. Fresh copy can be had as often as one wishes. Word processing can help any student, but advanced students benefit more.

BACKGROUND

The writing teacher's newest tool, word processing, is creeping into classrooms at a rapidly increasing rate. By 1983 Carnegie-Mellon, Drexel, Stevens, Clarkson, Virginia Tech, and others had decided to require their students to own personal computers. Fueling the fires of enthusiasm for word processing, William Zinsser (Writing with a Word Processor), Marsha Norman (playwright and author of 'night, Mother) and other well-known writers not only use word processors but share their enthusiasm with the world.

It doesn't matter what word processor or computer students use. Most word processing techniques have the same generic name; only the specifics of use differ.

THE DATA: CLASSROOM EXPERIENCES

In Spring 1983 twelve students, including three faculty members, signed up for Writing and Publishing in the Professions, an advanced course in technical writing. The goal of the course was to teach professional writing and publishing techniques, mixing traditional writing skills with the modern technique of word processing. The university provided funds to pay for accounts on Virginia Tech's IBM mainframe computer. One student chose to use FinalWord (by Mark of the Unicorn) on the IBM PC. The rest used the mainframe. Half of those students used Waterloo Script. The rest used IBM's DCF/GML (Document Composition Facility/Generalized Markup Language). All but one produced documents of high quality ranging in length from 15 to 45 pages. The cost averaged out to $45 per student--far less than anyone had guessed.

Since that time I have also taught the regular technical writing course with word processing. Perfect Writer and SuperWriter are available to the students in the university's IBM PC laboratory, and I encourage (but don't require) use of the programs. About two-thirds of the students choose to do so. With very few exceptions, the students who use word processing receive the higher grades because they're willing to revise more. Personal computers cost the university less to use (students buy their own storage media), but they often have the disadvantage of restricting the use of electronic mail, which requires a connection to the mainframe computer.

Most recently, students have turned up with word processors I didn't supply. Some of my students use Commodore 64s and KayPros that their parents bought for them.

RESULTS

Pump Priming and Drafting

Word processing makes it easier for students to get started. For students with writer's block, computerized freewriting helps break the block by teaching them to connect their fingers to their thoughts. Letters, which have a natural audience, and journal writing, which some of my students use to take project notes, also help to break writer's block. To use these techniques, students simply start a word processing file and type until done. If ideas in, say, the journal turn out to be sections the student wants in a document, word processing makes the section easy to copy electronically.

Starting a Document

To help my students focus on an audience, I teach them to use a "reader card." This used to be a 4x6 file card, but now it's a word processing file into which the students type:

** The intended reader; who will read it?

** The purpose; why write?

** The topic and scope; what is the document about?

** The plan; how should I present the topic?

** Topic sentence, preferably in 50 words or fewer.

The resulting "card" focuses thinking by forcing choices. Also, copied into the word processing file for the first draft, it acts like starter in sour-dough bread--it gets the action going with no special effort. For some mysterious reason I've never understood, we humans seems to find writing easier when a page or screen has something on it.

Nonstops also help students start documents. This technique resembles freewriting with the difference that writers try to focus the typing on a specific topic. After 10 minutes or so they stop, read, and try to find the focus. If they can't find one, they repeat the process. If they can, they use the word processor's "block copy" function to copy the focus and use it as the beginning of a new nonstop. They repeat the procedure as needed until they have the draft well started. Although this process can be used with a typewriter, it works better with word processing because the writer doesn't have to retype over and over.

Actual drafting closely resembles nonstops in that writers try to focus on the topic at hand. My students find fast drafting easier on word processors because corrections are so easy to make. In addition to easier writing from scratch, block and file copying enables easy use of prewritten passages whether these occur in outlines, reader cards, journals, or nonstops.

As always, students who draft from a detailed outline can work most rapidly, but even the writer of disorganized blocks works faster on a word processor because block copying later makes it easy to more chunks of text from one place to another.

My students delight in automatic carriage return ("word wrap,"), margins, spacing, paging and repaging. And particularly after finishing their first word processed document, they seem to benefit psychologically from the absence of extra work in traditional revision. Even major overhauls take only a couple of hours, and clean drafts appear on demand, with no errors from retyping and no need to recheck for errors. By the time they have finished their first drafts, many of my students have discovered that "it isn't writing I hate, it's the production hassle!"

That discovery changes conferences dramatically. No longer do the students and I bargain over what I want done vs how much retyping they're willing to either do or pay for. Instead, I often hear comments like, "And if I shorten this section and expand this one, then I can also . . ." At that point, I just stand back and keep out of their way.

Other features my students have liked for drafting: automatic numbering and renumbering of outlines and lists; storing frequently used words, phrases, and paragraphs for reuse; automatic centering and indent and hang, marking format "generically" (e.g., putting a "title" command before the title, a "chapter" command before the text for chapter title, coding first-level headings "h1", and so forth); automatic hyphenation; copying tables and graphs from data processing and graphics programs; math and decimal tabbing for tables; drafting front matter, indexes, and bibliographies automatically from text codes; and getting headers, footers, and page numbers automatically.

Why do students like automatic front matter, which had always struck me as a step to take near the end of document writing? One student explained it this way: "Because the word processor prints headings indented by level and gives page numbers, I can easily check the length of sections and the accuracy of my organization."

Revising a Document

Because I emphasize the importance of revision to good writing, I require several drafts of my students' major projects. The students who still use typewriters find the drafts a burden, but the rest don't mind at all. And once they've started revising, they especially like using electronic mail to ask questions and check sections of text with me and with their peer partners. In fact, electronic mail has encouraged students to work much more closely with me and with their partners than they would have if they had had to arrange a physical meeting and pay for a photocopy.

Most of the word processing features they appreciate for revision are familiar to technical writers--block move and copy, insert and delete, strikeover, string check and change, and so forth. Becoming important to some of my students, though, are new features such as automatic tables of contents and indexes, which enable students to devote all their efforts to the text itself, and text formatters that allow students not only to mark parts of a paper ("title," "chapter") but also to change the details of style without changing the text itself. For instance, students can format the same document with numbered or unnumbered headings, in APA style or CBE style, and so forth. Among the word processors that make this "generalized marking up" possible are IBM's DCF/GML (for mainframe computers) and FinalWord, Perfect Writer, ReadiWriter (nearly identical to GML), and Microsoft Word (all for microcomputers).

Also important is the ability to use "windows" on other text files to see what another document contains, to pull parts of other documents into the main file, and to write in several text files at the same time. Students frequently find, when revising, references that they want to add to the bibliography. Most word processors make writers close the text file and change to the bibliography file. With a few of the newer programs, though (most of the ones just listed), they only need to summon up the bibliography file, write the desired reference in it, file or save it, and then transfer from the bibliography window back to the main text window.

Using word processing has let me use systematic editing procedures with my students. For instance, about five weeks into each term I show a TV tape, Richard Lanham's "Revising Prose," which describes his "paramedic" method of revision. Lanham encourages students to "find the action; who is kicking whom?" To find the action, he tells them to find forms of the verb "to be" and prepositional phrases; then they look for ways to eliminate as many of both as possible. Because only eight forms of the verb "to be" exist, a word processor's locate function makes systematic, electronic searching easy. A manual search might overlook one or more instances, but the computer never does.

Students also use systematic procedures to find wordy phrases and change them to briefer equivalents.

Spelling and Grammar Checkers

Spelling and grammar checkers act as both a tool (to correct spelling) and an instructional aid. Every time a spelling checker objects to "seperate", making the writer type "separate" instead, both the mind and the fingers learn a new pattern. Some checkers find and correct all errors of the same kind at the same time. Others find the errors individually, sometimes making the writer correct the same error dozens of times. The former work more efficiently. The latter make better teachers.

Beyond grammar checking, some of the grammar and style programs highlight wordy phrases, forms of the verb "to be," trite adjectives, and many other writing flaws.

DISCUSSION

Benefits for Students

Students benefit from computer assistance by being able to concentrate on the substance of revision without worry over production. My students who use word processing turn out better, longer documents (a mixed blessing for the grader!) than those who cling to their typewriters. Some of them spend more time on writing than they would have before because word processing is still a novelty. Even the students who spend the same amount of time benefit more, though, because they spend more of that time writing and less of it "producing."

They also benefit from being able to reuse their documents, a fact that becomes more important as students mature. Honors projects and master's and doctoral theses sometimes emerge from the work done earlier for classes. When the work has been typed, reuse means retyping. On word processors, the student only needs to copy the desired material into the new document.

And some students eventually publish their work. My students have published computer documentation and scholarly articles. Several of my former students are trying to revise class projects to produce magazine articles, and a few ambitious souls are turning their projects into books.

When students remain at Tech, I try to make it possible for them to keep using word processing so they'll continue to write and improve.

Benefits for Teachers

Computer aids let me tailor classes to certain students. When students with very poor writing skills enter my class, I start them on documents they've written for other classes. They write on word processors, concentrating on correcting first one major problem and then the next. Each clean draft is easy to check quickly for mastery of the skill being practiced, and turnaround can be as short as a day.

I also also appreciate no longer having to mark spelling errors and wordy phrases. I know the computer will flag them, and all my students know better than to turn in papers with such errors! The grading goes faster, I know the students are learning from the corrections, and the students take pride in their spotless final pages, unmarked by even a single, penciled correction.

I've had several good chuckles over the pride. One team appeared in my doorway at the time their project was due. Lisa was cradling the required two copies in her arms. The students stood first on one foot, then the other, making small talk. I waited. Finally Lisa looked down at the copies. "They're so beautiful. I almost hate to give them up. I never felt that way about a class paper before." Quite a change from the students who toss a report on the desk at class time, glad to be rid of the thing.

Then a second member of the team volunteered, "If you need any changes, call me." I assured him I would, but only if he promised to tell me if he had too much work at that time to make the changes. (These students had written documentation for Tech's Computing Center, and what they wrote was to be published and used in our microcomputer lab the next quarter.) Again, quite a change, and one I find common in students who use word processors.

Benefits for Industry

Students trained on word processors come to industry already knowing how to use modern technology. For years computer companies have been donating equipment to computer science departments so that graduates come out knowing how to use their equipment. Word processing, computer, and software firms can reap the same benefits by donating equipment to technical and business writing programs.

CONCLUSION

Classroom word processing still isn't very common, but I expect it to become the norm. The campus craze for microcomputers will only grow stronger. It matters little why schools want students to have computers; once students have them, word processors are readily available, and all writing teachers can take advantage of them.

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The Question of Quality: New User Attitudes toward Word Processors

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During September 1983, 4 officers at Wright-Patterson AFB who had just become users of word processors were interviewed regarding the relationship between the word processor and quality. Their responses provided insight into three main areas: time, attitude, and quality. Time saved by the new technology may or may not be applied to improved quality of thought. Rather than merely producing documents faster, writers should address the relationship between technological advantages and improved quality of thought.

During September 1983, 40 logistics graduate students at the Air Force Institute of Technology were interviewed concerning the impact of word processors on writing quality. For the most part, these officers (age 24-30) had never used word processors before they started their Masters program, so the findings here may apply to other new users in business and industry. The especially valuable part of this environment was that 40 people with no writing experience on processors suddenly, because of time pressures, decided to change their manner of creating the written word. The word processors or home computer systems varied widely by manufacturer, but included Kaypro, IBM, Apple, Corona, NEC, and Franklin. This situation provided a unique opportunity for exploring attitudes and raised some issues that deserve attention.

Students were questioned as part of the end of course critique at the end of the summer quarter. The open-ended question asked, "How has the use of a word processor improved your wtriting." The final responses fell into three main categories: Time, Attitude, and Quality.

TIME

The writers focusd on four ways in which they felt that word processers saved time:

a. Elimination of the draft step;
b. Speed of Revision;
c. Ease of corraction;
d. Speed of typing.

Of special note was the belief of the new users that the draft step was deleted. If that in fact were true, then the word processors merely helped the user increase typing speed. Only if the user makes changes, thus working with a draft, will the word processor save time. Yet the users were adamant that the draft step, if done, did not seem like a draft step. Users commented that they sat at the keyboard, thought their ideas, and viewed their ideas on the screen. The increase in speed appeared to eliminate the draft step, but in fact did not. Because processors compressed the time required, the users felt that the drafting process did not delay them.

Users also commented that the ease of correction allowed them to improve papers when formerly they did not take time to do so, thus improving quality. Users stated that for one academic writing course the time savings amounted to 20-30 hours! If such a savings could be transferred to business and technical writing, the increased productivity per writer might be greatly increased.

The question of typing speed has not been resolved. While users agreed that the use of processor keyboards speeded the typing, some-times dramatically, over electric typewriters, there is no data to clarify the degree of difference, nor whether the difference comes from keyboard design or attitude change. The elimination of fear of making mistakes (since they are easily corrected) may increase risk-taking as one types knowing that mistakes are not "fatal." Additionally, since mistakes are so rapidly repaired, perhaps the writer no longer stops to contemplate his/her mistake and so has the sense of increased speed even if the actual speed is about the same. The sense of time gained from speed, combined with the sense of draft elimination, together indicated two dominant perceptions. Although it may be difficult to separate perceptions from reality, perceptions of gain to the user means that such a gain becomes a reality for that user.

ATTITUDE

Users identified five ways in which the processor favorably influenced attitude:

a. Writing was emotionally less painful.

b. Writing had become a fun game rather than a serious effort.

c. Since nothing is lost or misplaced as it was when using note cards, more information appears in the final written product. [Amazing--must have a processor in the library and never have a program crash]

d. Results that were not worth expending effort upon (rewriting) are now suddenly worth the effort.

e. Communication breakdowns were reduced.

The concept of writing as a painful task has been replaced now with the concept of writing as a game of moving material around the page. Some users might argue that the act of writing might become so easy as to require no thought at all--a summerland our current technology is about to achieve. In considering such an attitude change, however, new users especially appear to focus most on time and effort, rather than on quality, the essential question.

On the other hand, since authors can make changes which formerly were not worth the effort, the quality will actually improve. This factor especially applies to users who allot a set time for a given task. For example, if a major report is to receive 2 hours of work on a Saturday afternoon, woe betide the writer who exceeds the mentally alloted time! Having devoted the allotted two hours, the author then proceeds to a different project, still leaving the major report with severe organizational problems. While the fault for using such a justification to buy a word processor clearly lies with the user's attitude, and while the purchase of a processor should not excuse this type of attitude, the fact that a processor is available provides a time savings in which the user can fix problems and thus may improve writing quality.

An underlying attitude pervades the abvove list of perceptions though unmentioned by the authors themselves--the attitude that the product emmanates from one's mind rather than from interaction with other people. This attitude change may lessen rather than increase quality of writing. The elimination of the secretary because the writer can efficiently accomplish the typing task also eliminates the suggestions which might challenge the writer to justify a position or clarify a passage. Eliminating people who were present in the former method of document production may well lessen quality.

Overall, the changes in attitude indicated here may be argued to be either positive or negative. Ultimately, the inputs from users suggest one major point: The use of a word processor produces a time advantage which permits an improvement in quality if the user so desires.

QUALITY

Clearly the students recognized the gain in time as being useful. Although one can argue that the time saved on one project is merely wasted elsewhere, if the users apply the time gained to organize and to develop logical ideas, then the quality may indeed improve. Some of the attitude change mentioned above does have implications for quality, but a minority of the student comments directly treats the quality issue. Students designated six ways that resulted in improved quality:

a. Better organization;

b. Neater appearance;

c. Choice of alternatives visually displayed;

d. Ease of revision;

e. More time to think great thoughts;

f. Total continuity from start to finish.

Even without applying the saved time to the same writing project, the time gained may improve quality by enhancing project continuity. Since the project is completed faster, it may also be completed with fewer interruptions. The longer the project stretches out, the more chance of interruption with the resulting loss of continuity.

The selection of visual alternatives does seem related to final quality improvement since the user can view the outcome before the product is produced even in draft form. But even more importantly, alternatives related to organizational patterns may produce the true improvement in quality. As one user stated, "When I just had a typewriter, and there was something obviously wrong with the organization, I'd just leave it. I wouldn't bother to go back and fix it. Now, with a word processor, when I see something wrong with the organization, I can try several modifications and select the best alternative." In this case, the use of the processor has obviously improved quality, whether the reason be the change in attitude toward writing or the time savings. Errors or lack of precision which would have been allowed to stand are now revised.

IMPLICATIONS FOR QUALITY IN WRITING

The meaning of the new users' impressions of the benefits gained largely depends on the definition of quality. If quality means merely improving layout and spelling, or merely moving material about the page, then we can soon eliminate all human design. Once our technology can permit the machine to be programmed in advance to improve technical flaws, quality becomes the same technical achievement for anyone who can afford the systems to do the job.

If, however, quality means an insight into new relationships and new ideas, we must then admit that technology may be an aid, but the human intellegence is still, at least for now, the primary instrument for achieving this insight. Under this definition, ideas count more than technical corrections. Reexamining the attitudes of these new users strictly in relation to quality reveals the following:

a. The aspects recounted by the users under TIME do not significantly contribute to quality.

b. Under the ATTITUDE grouping, , unfortunately users regard writing as a technological fad of gamesmanship.

c. Much of what they considered QUALITY improvements, such as ease of revision, appearance, and improved organization are merely technical revision.

d. Three areas of QUALITY do remain: choice of alternatives, more time to think great thoughts, and improved continuity.

To a humanist, it is disconcerting that the writers now regard their craft as a solitary interaction with a machine. Not one of the new users considered the importance of peer review or the influence of peers in the creation process. Indeed, the emphasis was upon isolating oneself, implying that ideas are somehow the product of a solitary mind rather than the product of human interaction. If the key to discovering new concepts rests with the ability to connect apparently unrelated events, the isolation of the processor user may eventually result in the lack of great thought at the same time we improve the "average" of writing quality. At the risk of making many writers appear to produce a better product, we stiffle future greatness.

As a solution to this potential problem, experienced writers and editors must dicuss the quality issue with new users of technology to communicate the concept that achieving quality rests not so much with the new technology as it does with the thought process of the writer. Had the new users in this study managed to relate the impact of the word processor in terms of quality, the potential problem would not appear as great. In most cases, however, they did not. Instead, they merely noticed the most apparent effects of the new technology. Occassionally a user recognized the relationship between having more time available and improving quality. But most users presumed that time gained not as resource to expend elsewhere, but as an end in itself. Most users, when asked how the time saved would be expended, tend not to reply that they would spend additional time on research or project design, but rather on nothing. The word processor, then, tends not to improve quality because the users have never been taught either what quality thought is nor how to achieve quality in their writing.

We suspect that if the writer are a creative thinkers before sitting at a terminal, they still are. And if they aren't quality thinkers before starting started on the word processor, they still aren't. Awareness of both sides of the question concerning whether or not word processors improve quality is the first step to understanding. The second step involves a dialog within your work unit. Ask yourselves how many times in the work place ANYONE has talked about quality. Or, are they just producing?

Accreditation and Certification in Technical Communication

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A long sought after goal of many individuals in technical communication has been the attainment of professionalism. They strive for the acquired knowledge that professionalism implies, but also to gain recognition by their peers in other facets of industry, or in other professions. One traditional step in this process could be certification. But "Why certification?" you might ask. What benefits would all members enjoy from such a program? These and other questions must be answered before society members can effectively analyze the subject of certification. This panel recognizes that fact and provides information as part of the long-term STC effort towards recognition for the technical communication profession.

STC, as the world's largest professional organization devoted to technical communication, provides leadership in the education, improvement and advancement of technical communicators. Responding to member interest, STC is currently researching the feasibility of a certification or accreditation program for its members. Other professional groups have faced a similar situation. Various groups decided it was in their best interest to initiate a program. In every case, the decision was always made after extensive study and discussion.

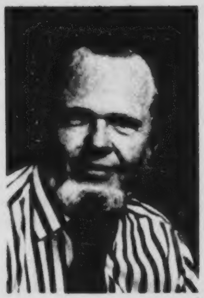
STC is no exception. After a member survey indicated sufficient interest, an ad hoc Committee on Certification was formed. This ad hoc committee has been fortunate to include a good cross section of individual views on the subject. The committee's purpose is simply to provide members with up-to-date background information on certification and accreditation. The goal is to provide an informational resource that members can draw upon in making any future decision on the subject. The committee will continue to perform this function as long as the need exists and at the direction of the STC Board of Directors.

The panel on Accreditation and Certification in Technical Communication provides a sample of the committee's efforts. It includes:

- a historical review of certification
- a progress report on certification
- a report on STC as an accrediting agency

Progress toward Certification of Technical Communicators

Andrew Malcolm



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Abstract: Predecessor organizations considered certification of technical communicators as long ago as 1964. An inquiry of members in 1975 showed little interest in the subject, but a survey in 1981 showed that 73% of the membership approved of the idea in principle. An ad hoc Committee on Certification was established in 1982. The Committee has collected ideas from other organizations and members, informed the membership of tentative plans, and obtained reactions of members to a tentative plan. Also, the Committee surveyed employers and found that significant numbers favor certification of technical communicators. Currently the Committee is surveying membership to determine their level of interest and exploring possible use of professional test development and administration.

INTRODUCTION

This is a report on the progress in establishing a program to certify technical communicators. At the outset, it should be understood that we use the word certification to mean documenting a person's skills and we use the word accreditation to mean affirming the quality of an educational program. This paper summarizes some of the work of many members of STC and STWP over nearly two decades. It includes detailed information on two surveys and the results of a forum.

EARLY WORK TOWARD CERTIFICATION

On the program at the STWP Convention in 1964 in San Diego, there was a session on certifying technical writers and editors. At that time, STC was STWP, ITCCs were called 'Conventions, and the expression 'technical communicators' was not in general use. More would be known about the session if there had been published proceedings at that time, but STWP's first proceedings were published with the 1966 convention in Ft. Worth. It is apparent that members have been considering this subject for many years.

In 1975, the STC Board and president Russell Terry undertook to determine the level of interest in certification. The survey was taken by inserting a questionnaire in Intercom. The results indicated a relatively low-level of interest in the subject at that time.

Dr. Robert DiGiavoani, manager of the ad hoc Committee on Certification in 1981, started members thinking about the subject of certification by (1) mention of this subject at the Chapter Leaders' meeting at ITCC81, (2) having then President Ronald Field send a letter to each chapter asking them to devote a meeting to the subject, (3) having director-sponsors encourage chapters to have discussions on this subject, and (4) having articles on this subject in Intercom and Tieline.

In March 1981, Dr. DiGiavoani with the sanction of the STC Board conducted a study of member interest in certification. He reported as follows to the STC Board on April 16, 1982:

> [We] ... poll[ed] STC members via a reply-paid postcard questionnaire (March 1982) on their opinion of an STC certification program - including the specific statement that "If a simple majority of those voting YES or NO approve such a program in principle, then a specific program will be prepared and submitted to the membership for approval."
>
> Final totals were: YES 1,825 (66%), NO 674 (24%), UND[ecided] 280 (10%), TOTAL 2,779. The total number of responses, 2,779, was 50% of the total number of questionnaire cards mailed, 5,600. The YES responses vs. the NO responses were 1,825 vs. 674 or 73% vs. 27%.
>
> Our conclusions are that certification is very important to STC members, ... and ... indicates a directive to proceed "to prepare a specific program and submit it to the membership for approval." (DiGiavoani, Report of the ad hoc Committee on Certification, April 16, 1982)

THE CURRENT WORK TOWARD CERTIFICATION

Near the end of ITCC82 in Boston, then President Kenneth Cook, Jr., appointed the author as manager of the ad hoc Committee on Certification. Members were appointed to the committee who were geographically distributed. The current committee (Jan. 1984) consists of Andrew Malcolm, Manager, Rochester Chapter; Edward Hoffman, Rocky Mountain; Judith Jack, Anne Ladd and Patricia Carnavon-Smith, Boston; Nancy L. Karner, Mid-Hudson; Michael Manni, Twin Cities; and Rebecca Sekelsky and Laura Woodside, Orange County. Renee Barnow, Kenneth Cook, Jr., Shirley Carter, Jeffery Hibbard and Janis Raymond of the Board have made significant contributions to the efforts of the committee. The committee has met in Rochester, Washington, Princeton, Tuscon, St. Louis, Albany, and Atlanta. The next Committee meeting will be in Princeton, NJ, on March 1, 1984.

The Committee has identified three major areas to be addressed; (1) collecting ideas from other organizations and STC members, informing members of tentative plans, and obtaining member reactions, (2) collecting data by survey, and (3) developing a tentative program document.

Collecting Ideas and Informing Members

Under the direction of Dr. DiGavoani, data on existing certification programs for similar professions were collected and given to the ad hoc Committee on Certification. The Committee sponsored a two-session open forum at ITCC83 in St. Louis to present current thinking, and to hear the ideas of members. A total of 58 members attended between the two sessions and made extensive comments. Some were opposed to the idea entirely, while others made suggestions for the improvement of the program as tentatively proposed. Some of the proposed ideas have been incorporated into the tentative program document including, but not limited to the following:.

As originally conceived, applicants for certification would have taken an examination designed specifically for their technical communication vocation. But at the suggestion of one person at the forum, the Committee has changed the tentative program document so that applicants will have the opportunity to select between a number of tasks that show their skills to best advantage. Others reminded the Committee to provide for persons currently unemployed and persons who do not enjoy their employer's approval. Another issue raised at the forum was to address employer and public awareness of certified technical communicators. And still another was to have the Committee develop a definition of a technical communicator on which most technical communicators might agree.

Collecting Data by Survey

As previously stated, surveys conducted in past years have provided impetus to the current program. Upon recommendation of the Committee, the Board has to date authorized the Committee to conduct two surveys, viz., (1) a survey to determine how employers value certification, and (2) another to determine the level of interest of members along with demographic information on those interested and not interested in a certification program. The former survey has been completed and is reported herein. The latter survey is underway and will be reported at ITCC84 in Seattle in May 1984.

Employer Survey

To determine if STC should develop a certification program, it is useful to know if employers would value such a program. The STC Board authorized the ad hoc Committee on Certification to conduct a survey of employers.

Method: The Committee developed a list of employers by writing to each chapter chairman and asking for a list of persons who hire technical communicators in their chapter. Ultimately, the responses from chapters produced a list of 137 employers. Because the number was not large, the entire list was used as the basis of the survey. Three of the surveys were returned because of address deficiencies so that 134 surveys were delivered to potential employers.

Survey Results: The Committee received 57 responses (43%). The survey began with questions to determine who the respondents were (demographic data). All respondents provided their names, titles, affiliations, and addresses. The respondents were geographically distributed as follows:

Northeastern states:	20
Southern states:	13
Midwestern states:	15
Western states:	9

The respondents were asked to state the, "total number of persons employed at [their] facility." The responses (n = 52) ranged from two employees to 67,000 with the mean being 2,400. Respondents were also asked to state the number of persons who worked in various technical communication vocations, and to identify them by departments and membership in STC. This yielded incomplete data and therefore is not reported.

Following the demographic section, the following questions were asked with the results as shown:

1. When considering several candidates for employment, would you favor the candidate with a certificate in technical communication?

YES: 31 (57%), NO: 23 (42%), NO RESPONSE: 3

2. If a current employee obtained a certificate in technical communication, would you (2a, 2b and 2c):

2a. recognize the employee for this achievement?

YES: 45 (82%), NO: 10 (18%), NO RESPONSE: 2

2b. increase the employee's salary?
YES: 11 (20%), NO: 44 (80%), NO RESPONSE 2

2c. increase employee's responsibility?
YES: 13 (25%), NO: 38 (75%), NO RESPONSE 6

3. Do you believe that a certification program would benefit your organization?
YES: 26 (49%), NO: 27 (51%), NO RESPONSE 4

4. Do you, in general, favor certification of some occupations?
YES: 51 (89%), NO: 6 (11%), NO RESPONSE 0

5. Do you think that a certification program should include accrediting educational programs in technical communication?
YES:40 (77%), NO: 12 (23%), NO RESPONSE 5

6. Which of the following technical communication vocations do you think should be certified (6 categories)?

Technical writer?
YES: 36 (68%), NO: 17 (32%), NO RESPONSE: 4

Technical editor?
YES: 29 (59%), NO: 20 (41%), NO RESPONSE: 8

Technical illustrator?
YES: 19 (42%), NO: 26 (58%), NO RESPONSE: 12

Technical a-v specialist?
YES: 17 (40%), NO: 25 (60%), NO RESPONSE: 15

Marketing communicator?
YES: 10 (22%), NO: 36 (78%), NO RESPONSE: 11

Tech. communication manager?
YES: 17 (35%), NO: 31 (65%), NO RESPONSE: 9

7. Would you pay the certification fee for full-time employees ($100±)?
YES: 21 (42%), NO: 29 (58%), NO RESPONSE 7

8. Would you favor a program that required periodic recertification?
YES: 16 (41%), NO: 35 (67%), NO RESPONSE: 6

Discussion: The data show that employers tend to look favorably on certification of technical communicators. It is not a majority, but responses to questions such as question 1 show more favoring certified employees than not favoring them. This approval , however, seems to be of marginal importance as may be deduced from the answers to questions 2b (increase salary), 2c (increase responsibilities), and 7 (pay certification fee). Although employers would recognize employees for achieving certification (2a), they do not see certification as a cause to either increase salaries (2b) or responsibility (2c) of employees. Also, the majority of employers are unwilling to pay the fee to have employees certified (7). This same feeling is reflected in answer to the question (3), "Do you believe that a certification would benefit your organization?" Half of the respondents thought that it would, and half thought it would not.

The respondents clearly indicated that employers in this study, and probably in the public in general, favor certification of some occupations (question 4). Thus, we may conclude that the respondents are not a group of persons who generally oppose the concept of certification. A number of respondents provided written comments indicating that they generally opposed certification of any occupations. Those generally opposed to certification of any kind comprised 11% of the respondents.

The respondents seem to indicate that employers in this study support the idea of certifying technical writers and editors but do not support the certification of the other technical communication vocations listed in the survey (question 6).

The respondents seem to indicate that employers in this study see no reason to requalify persons once they are certified. (It is interesting to note at this point that a number of persons at the forum and one by letter to the Committee felt strongly that once shown to be qualified, a certified technical communicator need not be recertified.)

Three-quarters of the respondents felt that employers favor accrediting educational programs. Only two questions received a larger number of positive responses, recognition of employees (2a) and certifying other occupations (4).

Conclusions: One may conclude from this study that employers generally favor certification of technical writers and editors. A certification program for technical writers and editors would be accepted by employers, but employers would not rely upon certification as a major reason to hire one person over another. nor would they reward a certified person in a material way.

In making inferences from the responses to questions 2a, 2b, and 2c, one should recognize the situation of the employer considering a salary increase, or increased responsibilities. The situation suggests that the employee is not a new hireling; the employer is likely to have experience with the employee and certification would be quite superfluous in these circumstances.

Two directions derive from this study. Any program developed by STC should offer certification only to technical writers and editors or be independent of vocational subdivisions. Also, periodic recertification is apparently not wanted, and a program of accreditation should be investigated.

Member Survey

To determine the number and characteristics of STC members who would seek certification if it were offered, the ad hoc Committee on Certification randomly selected 101 members from the 1982 STC Membership Directory and many responses have been received. The responses were not analyzed in time for inclusion in this, the _Proceedings of the 31st ITCC_.

Developing a Program Document

The first activity of the _ad hoc_ Committee on Certification was the development of a tentative document describing a certification program for technical communicators. Through the efforts of several Committee members, such a document has been written and is being maintained. When significant input is received from members or survey results, the program document will be altered.

As currently configured, the program document calls for a program of testing, education, experience, evaluation, certification and appeals processes, and sets up an organization to deal with these.

FUTURE DIRECTIONS

The _ad hoc_ Committee on Certification continues to operate at the pleasure of the Board and the manager serves at the pleasure of the President of STC, so future directions depend upon future approvals. The Committee is currently authorized to develop a request for proposal and quotation from organizations in the occupational testing field. One meeting has already been held with Educational Testing Service of Princeton, NJ, and another is scheduled for 1 March 1984. The Committee plans to proffer a request for proposal and quotation to the Board at the meeting on 28 April in Seattle.

The Committee is also considering what might be done to satisfy the demonstrated desire of employers to have educational programs accredited.

Historical Review of Certification

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This paper examines why and how other professional societies have initiated certification/accreditation programs. It summarizes research performed by sampling the programs of other organizations. Two significant goals and six potential benefits of such a program are described. The paper also includes references to more tangible factors, such as cost and fringe benefits. In conclusion, the paper documents an example of the controversy surrounding the subject of certification.

Certification has been an on-again, off-again topic of discussion between STC members for several years. These discussions raised several well-grounded concerns. The 1977 STC Ad Hoc Committee report advised the membership of these questions, and was summarized in the First Quarter 1980 Technical Communication. Since 1977, some evidence of growing interest in certification surfaced. To recognize this, a certification survey was taken. As reported in the September/October 1981 Intercom, 66% of the respondents favored the concept of certification. To give further opportunity for discussion, the 30th ITCC included an Open Forum on Certification. The 31st ITCC includes a panel which updates STC research on certification/accreditation. The following paragraphs examine the issue of certification today, and compare the STC proposed procedure to that of other societies.

My sample of certification programs included societies or associations with fewer than 500 people certified, to one with 23,000 certified professionals. There are some common points that STC shares with these other groups. To generalize, the other societies with certification programs regard their work as a blend of art and science. Our peers feel that their professions are weighted more towards art than science. They also work in broad fields of endeavor, like STC members. Their society ranks include nonprofessionals. To illustrate, there is a medical field, but to say that all people working in the medical field are professionals would be inaccurate.

SIGNIFICANT GOALS

This research disclosed two significant goals in regard to certification among other societies. They are:

1) Certification is not a goal, in itself. Professionalism is the goal. They are looking for the type of recognition accorded the accounting, medical, and other professions.

2) The second goal is improved educational programs at learning centers, either chapter, vocational, or the college/university level.

Certification is considered to be a concrete step toward professionalism. It is a means of evaluation. Certification provides individuals with a measurement of skills against standards set by their peers. Going through the process itself, with all the attendant self-evaluation is regarded as therapeutic, and one of the principal values of the program.

POTENTIAL BENEFITS OF CERTIFICATION

1) Improved Morale

The assumption is that growth in professional status will increase pride in ourselves and our society. Some societies have struggled with the stigma of being considered a "pass through" society. That is, people pass through a particular society only to gain background for another position. With certification, it is anticipated that a person is more likely to remain an active society member, even after moving into the management ranks.

2) Improved Chapter Education Programs

Local chapters may be motivated to establish education programs. Completion of the program can constitute accreditation. For example, the American Medical Writers Association (AMWA) provides a 24 hour (eight course) curriculum. Four courses are in basic skills ("trunk") and four courses are in an area of special interrest ("stem"). Upon completion, the candidate receives a certificate (that states completion of a prescribed course of study) in medical communication. For those persons that don't want to specialize in a stem, a multi-stem study program is available.

3) Improved External Courses/Curricula

It is anticipated, with a certification program, that the major learning centers will begin to teach the specific body of knowledge.

4) Additional Society Publications and Manuals

Other societies have often used grants to develop training manuals and other aids for use in preparing for the certification requirements.

5) Self-improvement and Education

The major objective of certification programs in other societies is really to educate the members. To successfully complete a certification program requires a personal self-disciplined learning program. Certification becomes the formal recognition of your self-improvement and education program.

6) Compensation of the Profession by Industry

It is anticipated that with the recognition of professional status by industry leaders, benefits will improve in the areas of salary, promotions, and job security.

ADDITIONAL DISCUSSION POINTS

-- Levels of Certification: My sample didn't disclose more than one level of certification in other societies. The American Production and Inventory Control Society (APICS), however, has "two critical scores on each test," a "Passing" level score and a "Fellow" level. The "Passing" score entitles you to become certified. The "Fellow" score is greater recognition for a higher score on the tests. If you get the higher score and desire to be designated a "Fellow" you must pledge to participate in educational programs for the benefit of others in the field.

— Employer Use of Certification: Other societies state that employers use their certification guidelines. For example, the American Society for Quality Control (ASQC) states that many employers utilize ASQC certification programs in their personnel policies. The Public Relations Society of America (PRSA) provides another example. PRSA states that their accreditation is a prerequisite for executive hiring and for advancement in public relations.

-- The cost Factor: The fee for administering the accreditation program for the International Association of Business Communicators (IABC) is $100. This is a typical figure at today's costs.

— Revocation: Other societies retain the right to withdraw certification for falsification of credentials or unethical behavior. Most societies require the candidate to encorse a code of ethics.

— Fringe Benefits: Other societies sanction the use of a statement, such as "STC Certified," on personal letterheads and business cards.

— Type of Testing: Some societies require both an oral and a written exam. This is required by the IABC and the PRSA. Also, practice tests can be purchased from societies. As an example, the American Translators Association (ATA) sells practice tests for a fee.

-- Numbers Certified: The Chicago-based Institute for the Certification of Computing Professionals (ICCP) issues the Certificate in Data Processing (CDP). The CDP is held by 23,000 people. It's been given for twenty years. From that high end of the range, there are societies with fewer than 500 people certified, such as the IABC.

CASE-IN-POINT: THE CDP, AN EXAMPLE OF CONTROVERSY

The ICCP is a non-profit organization that was established to test and certify the knowledge of computing personnel. ICCP is composed of representatives from various professional societies. Roland D. Spaniol, ICCP President, said, "At the moment, the goal of the CDP is to improve the profession, not necessarily the individual. It's a very altruistic undertaking."

One criticism against the CDP is the "currency" issue. Critics say that unless the CDP is recent it does not mean much because technology changes so rapidly in the computer field. This brings up the question of renewal. Should the CDP be renewed, thus signaling to employers that the holders have the latest state-of-the-art knowledge? Several ways that the ICCP has considered to keep the certification current include requiring holders to re-take the exam every year or every other year, keeping track of holders' published papers and other accomplishments, and issuing credits for seminars and courses taken. However, the ICCP is not ready to rescind certificates, Spaniol says.

A common observation is that many excellent computer professionals have no technical schooling at all. Recruiters state that there is no effective way to know if a job applicant is going to work out until a person is hired and actually does the job. David Moore, owner of a job placement firm said, "The CDP is an accomplishment and I'm proud of it, but it helps the ego and prestige more than it gives any concrete benefits." There is a remedy for this, called standardization, but it's very controversial. This refers to the possibility of the CDP being made a minimum requirement to function in the field. That means many excellent computer specialists would not be allowed to work. Obviously, this would be a radical step. The ICCP president admits the industry isn't mature enough to make the CDP mandatory.

The bottom line on the certification issue is this:

> Although certification does give applicants a bit more professionalism, most people agree that certificates don't help people get jobs, promotions, or pay raises because they have little value, except to the holder.

The major questions brought forth in the 1977 report remain partially unresolved, also. They refer to the following:

1) Is there support and recognition by employers? (This has been researched via a survey.)

2) The legal question:

   Is there possible liability resulting from certification of persons who prove to be incompetent in given areas or tasks?

> Is there possible liability resulting from the denial of certification to others who might maintain --rightly or wrongly-- that they had been denied employment or advancement as a result?

However we may respond to the issue of certification, we would be well served to remember that the Department of Justice ruled that technical writing is a profession. And, as Henry Knoll of the Ottawa chapter said, "After all, technical writing is--if nothing else--a phenomenal service to society."

REFERENCES

1. "Certification of Technical Communicators," Technical Communication, vol. 27, no. 1, 1980, pp. 4-6, 15.

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3. "Headquarters Report," Technical Communication, vol. 29, no. 4, 1982, p. 45.

4. Henry Knoll, "On Being Spaced Out," Technical Communication, vol. 30, no. 1, 1983, p. 44.

Proposed STC Certification Procedure

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ABSTRACT

The ad hoc Committee on Certification proposes a certification program operated by STC to license technical communicators. The proposal contains two levels and is designed for all varieties of technical communicators: writers, illustrators, managers, publishers, audio-visual and graphics designers. The program requires fees, examinations, letters of recommendation, and a supervised practicum for novices. Awarding of certificates is made by a Standing Committee on Certification upon the recommendation of a Review Subcommittee, but the applicant has several opportunities to appeal an unfavorable decision.

SCOPE OF CERTIFICATION

To assure quality and ethics in technical communications, the ad hoc Committee on Certification is proposing a procedure for certifying technical communicators. This plan has not been adopted by the Society for Technical Communication (STC).

Since the primary responsiblity of the technical communicator is to transmit technical information from many sources--scientists, engineers, technologists, or himself/ herself--to various audiences, using forms appropriate for those audiences, the program certifies technical communicators only in communication skills, not in any science or technology. The technological fields are too numerous to be dealt with by this program, and other professional organizations provide certification in those areas.

The STC Certification Program has been established to assist employers in judging the competency of current or prospective employees, consultants, or contractors in communication. The procedure provides (1) an initial certification procedure, including a limited period for currently qualified persons to be certified (grandfathering), and (2) a continuing certification procedure.

Since the vast majority of STC members and sponsors write in English, this procedure is currently intended to apply only to English. Should a demand develop for certification in one or more other languages, this program could extend to cover that need.

CERTIFICATION LEVELS

The program establishes two levels of certification: Certified Technical Communicator (CTC) and Certified Senior Technical Communicator (CSTC).

Certified Technical Communicator (CTC)

The requirements for CTC status are (1) A combined equivalent of three years (full time) education and/or experience in technical communication at the time of application for CTC status, (2) An examination established by STC, (3) Six months of supervised practicum. The applicant's immediate supervisor or a Certified Senior Technical Communicator supervises the practicum, reports on the applicant's progress, and submits samples of the applicant's work to the Committee on Certification, (4) Six additional months of experience during the application and approval cycle.

Certified Senior Technical Communicator (CSTC)

The applicant for CSTC status may complete one of the following sets of requirements:

Upgrading from CTC status

(1) CTC status and two years additional education and/ or experience in technical communication at the time of application for CSTC status. (2) An examination established by the Committee on Certification. (3) Six additional months of experience during application and approval cycle.

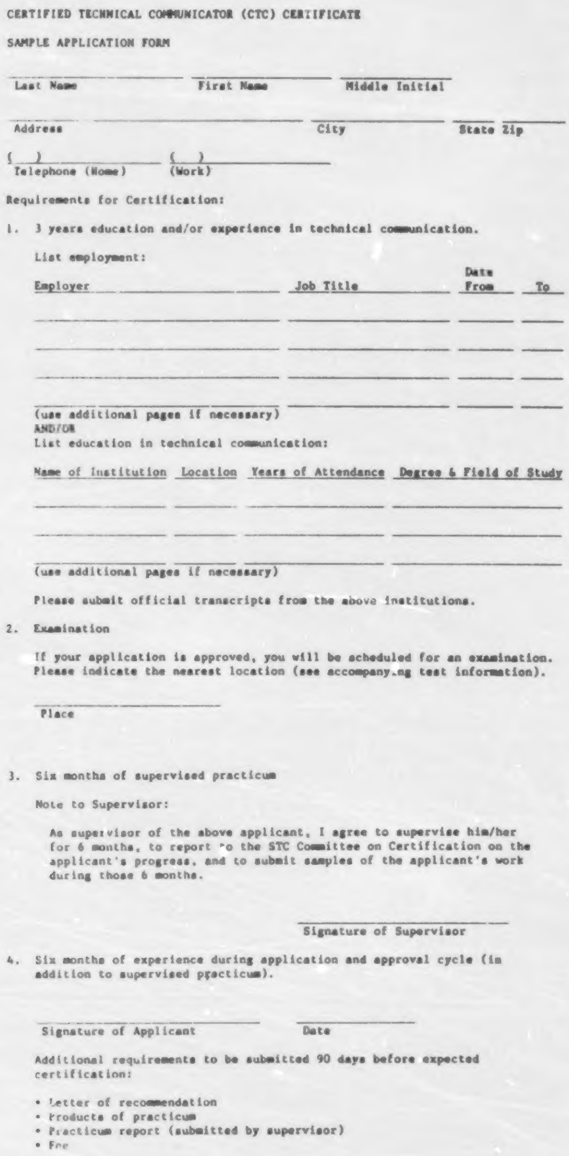
New Application

(1) A combined equivalent of five years education and/or experience in technical communication at the time of application for CSTC status. (2) An examination established by Committee on Certification. (3) Six additional months experience during application and approval cycle.

CERTIFICATION PROCEDURE

Forms

The applicant initially applies on a form requesting limited demographic information and conveying information about certification requirements. The standing Committee on Certification maintains and modifies the form as needed.



CERTIFIED TECHNICAL COMMUNICATOR (CTC) CERTIFICATE

SAMPLE APPLICATION FORM

Last Name ______ First Name ______ Middle Initial ______

Address ______ City ______ State Zip ______

( ) ______ ( ) ______
Telephone (Home) (Work)

Requirements for Certification:

1. 3 years education and/or experience in technical communication.

List employment:

Employer	Job Title	Date From	To

(use additional pages if necessary)
AND/OR
List education in technical communication:

Name of Institution	Location	Years of Attendance	Degree & Field of Study

(use additional pages if necessary)

Please submit official transcripts from the above institutions.

2. Examination

If your application is approved, you will be scheduled for an examination. Please indicate the nearest location (see accompanying test information).

______
Place

3. Six months of supervised practicum

Note to Supervisor:

As supervisor of the above applicant, I agree to supervise him/her for 6 months, to report to the STC Committee on Certification on the applicant's progress, and to submit samples of the applicant's work during those 6 months.

______
Signature of Supervisor

4. Six months of experience during application and approval cycle (in addition to supervised practicum).

______ ______
Signature of Applicant Date

Additional requirements to be submitted 90 days before expected certification:

- Letter of recommendation
- Products of practicum
- Practicum report (submitted by supervisor)
- Fee

Sample CTC Application Form

Fees

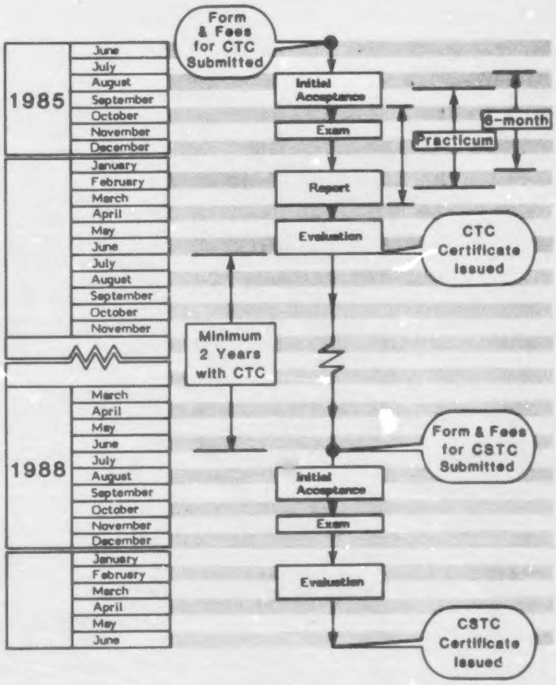
The Certification Program is self-supporting through fees which accompany applications. The Committee on Certification establishes the fee schedule, subject to the STC Board of Directors approval. Decreases or increases are based on actual cost when the program is in progress.

Initially, the fees are established as follows:

First application for CTC	$100.00
First application for CSTC for persons holding CTC status	50.00
First application for CSTC for persons not holding CTC status	150.00

Application Period

Applications for CTC status and CSTC status are sent to the official address of the Committee on Certification on or before the last day of December each year. There is a one calendar year waiting period from the time of application until CTC status or upgrade to CSTC status is awarded. There is an 18 month waiting period after application before CSTC status is awarded to those not holding CTC status.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Exam
Report
Evaluation
CTC Certificate Issued
Practicum
6-month
Minimum 2 Years with CTC
Form & Fees for CSTC Submitted
Initial Acceptance
Exam
Evaluation
CSTC Certificate Issued

Preliminary Schedule for Receiving
CTC and CSTC Certificate

CTC Certification Period

CTC status lasts two calendar years. After two years and continuing active engagement in technical communication, persons will normally apply for CSTC status.

If a person is not actively engaged in technical communication during all of those two years, their CTC status will be suspended for a period of two years. If, at the end of those two additional years, a person with suspended CTC status has fulfilled the experience requirement, he or she may elect to apply for CSTC status in the normal manner. However, if the person does not apply for CSTC status, the CTC suspended status will be revoked by the Committee on Certification.

CSTC Certification Period

CSTC status is awarded for life.

Examination

Examinations are offered in locations as near as possible to the applicants. Multiple locations are used whenever practical, and locations are in consonance with STC functions, such as the ITCC.

Since Technical Communication covers a wide range of skills--writing, editing, graphics, audio-visual, publishing, managing--the examination will consist of a battery of 15 or 20 tests covering various categories. The applicant may select approximately 10 areas.

The examination is devised by the Committee on Certification in consultation with test developers, and it stresses performance of tasks directly associated with the work of technical communication. For example, applicants may all be asked to design documentation in their selected areas for a model device. Full manufacturing documentation and a prototype will be provided. Applicants taking the test for military documentation may be asked to write a proposal; those for hardware documentation an installation procedure; those for software documentation a software guide; and those for technical illustration may be asked to illustrate a maintenance procedure.

Supervised Practicum

Each applicant for initial certification participates in a supervised practicum extending over six months. The supervisor and the applicant establish goals for the 6-month period. In lieu of a supervisor, a member holding CSTC status (initially a senior STC member or an associate fellow) may supervise the practicum. At the end of the practicum, the supervisor reports to the Committee on Certification, and the applicant submits products of the practicum to the Committee on Certification for evaluation.

Application Review

The initial application, examination paper, letter of recommendation, practicum report, and practicum product are reviewed by a regional Review Subcommittee assigned by the Committee on Certification. Members of the Review Subcommittees determine on the basis of their own knowledge of technical communication whether applicants have demonstrated adequate skills to be certified. When the Review Subcommittees develop experience, they will set specific guidelines to be approved by the Committee on Certification. Any member of a Review Subcommittee may move to certify any applicant; a majority vote of the members then results in certification. Persons whose applications are denied have the right to appeal a negative decision to the Appeals Subcommittee. Applications for review must be submitted at least 90 days before the close of the review period.

Appealed Applications

Each applicant may take a rejected application to the Appeals Subcommittee. The Appeals Subcommittee will act on the findings of the Review Committee and the application as soon as possible. They may, by majority vote, (1) approve the application and certify the applicant, (2) deny the appeal, or (3) return the application to the Review Committee for reconsideration. Reconsiderations which are denied may be appealed to the Appeals Subcommittee again. If the Appeals Subcommittee also rejects an application, the applicant may appeal to the Board of Directors of STC through the Committee on Certification. The STC Board of Directors makes a final decision.

Certificates

Upon certification, the Committee on Certification issues a certificate which displays the period, level, and meaning of certification.

Special Provisions for Persons Claiming Pre-existing Skill Levels (Grandfathering)

Persons who have achieved senior membership or who have been elevated to associate fellow or fellow (but not honorary fellow) of STC by the end of the first certification year (tentatively June 30, 1985), will be considered for CSTC status without the practicum.

Removal Procedure

If the holder of CTC or CSTC status commits a serious violation, such as a breach of ethics, the Committee on Certification reviews the issue as soon as possible. If a majority of the Committee votes to revoke the certificate, the case goes before the STC Board of Directors, which has the authority to revoke the certificate.

If the former recipient wishes to reapply for certification, he or she may reapply for CTC status through the normal channels after 12 months have elapsed from the date the certificate is revoked. If the certificate is reissued, the candidate must wait the normal two years to apply for CSTC status.

CERTIFICATION ORGANIZATION

The STC Certification Program is established by the STC Board of Directors and operated by the Standing Committee on Certification (SCC).

Standing Committee on Certification

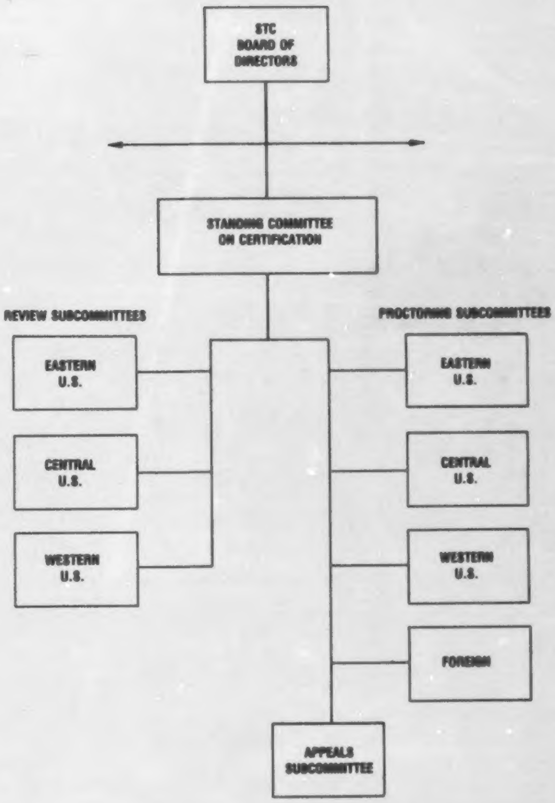
The SCC consists of five or seven members, at the option of the Board of Directors. The president of STC shall nominate persons for these positions and designate one of the nominees for SCC manager with the advice and consent of the STC Board. Initially two members of a 5-member committee or three members of a 7-member committee are selected for 3-year terms, and all others nominated initially and thereafter are nominated for 2-year terms. The manager is one of the members of the committee and is appointed by the STC Board of Directors, who may also remove the manager. Members may succeed themselves.

Standing Subcommittees on Certification

As a minimum, there is a Review Subcommittee, a Proctoring Subcommittee, and an Appeals Subcommittee. Review Subcommittees and the Appeals Subcommittee have five or seven members (initially 5), and Proctoring Subcommittees have a minimum of two members and a maximum of twelve (initially 3) with at least one proctor on each subcommittee of each sex. (NOTE: This is to allow a proctor to accompany any person taking the test to a restroom during a test, should this be necessary.) The number of members of each subcommittee is an option of the SCC. The manager of the SCC nominates persons for these positions, designating some of the nominees as subcommittee managers, with the advice and consent of the members of the SCC. Initially, there are seven subcommittees:

- Eastern U.S. Review Subcommittee
- Central U.S. Review Subcommittee
- Western U.S. Review Subcommittee
- Appeals Subcommittee
- Eastern U.S. Proctoring Subcommittee
- Central U.S. Proctoring Subcommittee
- Western U.S. Proctoring Subcommittee

The manager of the SCC nominates persons for these positions, designating one of the nominees for each subcommittee as manager, with the advice and consent of the members of the SCC.



Organization Chart

How Humans Construct and Communicate Technical Concepts

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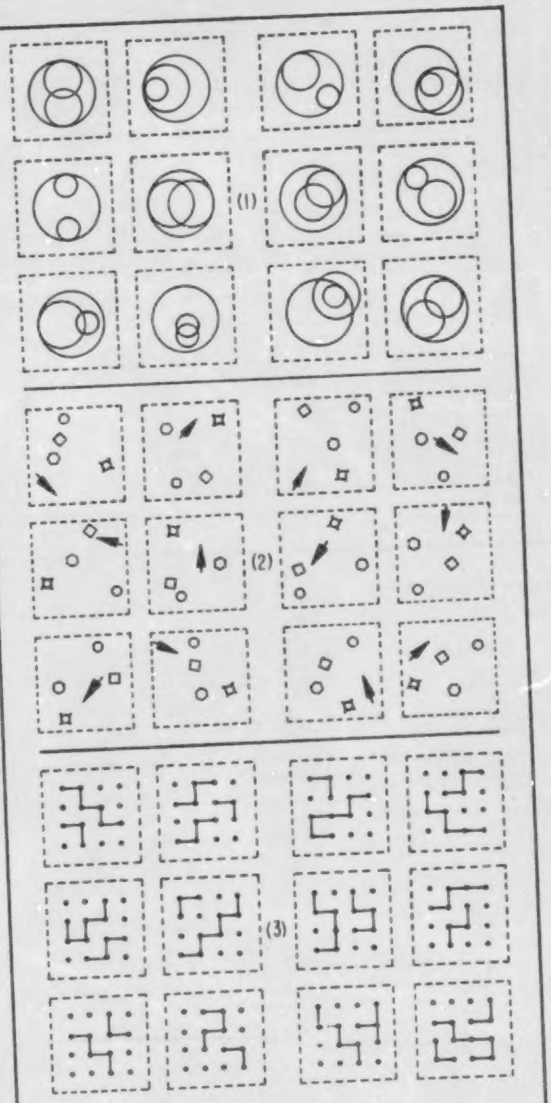
Post-doctoral studies in the
structure and communication of
technical concepts

Classifying and abstracting are two basic information processing activities for constructing concepts. The workshop provides an empirical test for confirming that two or more individuals have constructed the same concept. This test identifies reference bases and is employed in specific activities during the workshop. These activities demonstrate how reference bases function in the construction and communication of technical concepts and how subjective humans can attain objectivity. Experiences with both subjective and objective reference bases demonstrate distinctions between technical and non-technical concepts.

Each of us is a system for receiving, processing, and transmitting signals. We do not receive and transmit information or knowledge or facts, . . . only signals. The enormously complex activity within our brains receives the signals as sense impressions, classifies those sensate data, and abstracts relationships and functions to construct what is called a "state of knowledge." A technical definition of information involves identifying a change in this state of knowledge for a given system. The construction of this state of knowledge is a private activity, just as all sense impressions are private. How, then, do two or more subjective systems establish a means of relating to each other so that each can confirm objectively the correspondences between and among their states of knowledge?

Through our activities in this workshop, we will demonstrate how humans construct concepts and how they can communicate concepts to establish inter-subjective objectivity.

The demonstrations emphasize how technical concepts differ from natural language concepts and how technical communicators make use of reference bases and operational definitions. The principles demonstrated here have significant implications for technology transfer, for education, and for the philosophical foundations of our professional field. Through applying these principles, we can attain empirical evidence that a given transmission of signals has resulted in communication as intended. This empirical evidence, along with the testing and objectivity, supports our professional claim to technical communication.



One of the workshop activities demonstrates human information processing in concept construction. This activity involves pattern recognition problems similar to those designed by M. Bongard (Pattern Recognition, 1970). The observer identifies a feature that is represented equally in each of the six squares on the left, and that has a contrasting form represented equally in each of the six squares on the right. For example, in set one, centers of the circles in each of the six squares on the left align vertically or horizontally relative to the square. Those in each square on the right align on the diagonal of the square.

Developing the Complete Career Day: The Los Angeles Chapter Experience

Fred Klein, Moderator

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This workshop deals with a Career Information Day which was initiated and organized by the workshop leader in May of 1983 at the University of Los Angeles (UCLA) in Los Angeles.

The event was very successful, bringing together some 350 participants from 28 universities. Though many similar Career Days have been organized by STC Chapters across the country, I used different approaches and innovative methods which should be of interest to other Chapter leaders.

In the case of our Los Angeles experience, the Chapter did not have any systematic contact with the many universities and colleges of Southern California. Though Los Angeles has close to 300 members, the Chapter had not organized any competitions of any kind on a local or regional level, there were no seminars, workshops or co-op programs. Los Angeles had hosted a highly succesful ITCC in 1979 and organized excellent dinner programs. Chapter membership was changing and growing, but involvement and active participation lacking. Looking back, the choice of the Career Information Day was obvious.

In my initial, experimental appeal to potential volunteers, I talked about undergraduates in a recession, the role of STC in assisting them, the need to attract new young members. I had found a good cause. In 10 weeks I had over one hundred volunteers from the region, members and non-members. I spoke at many meetings, but the event was organized without a special committee, with a minimum of red tape, no extra sessions. I argued successfully that a large urban area as Los Angeles makes it difficult if not impossible to ask volunteers to travel far at night and to spend extra time. Almost all the effort was carried out by mail and telephone follow-up.

We had a budget: $1300 plus $1000 from a merit grant from international STC headquarters. But the event was completely free for all participants.

Workshop participants will hear a summary of the event, given samples of all printed material used as well as giveaways.

In a subsequent discussion, individual situations, do's and don'ts will be dealt with, with the goal to help chapter officials in organizing their own similar events. Experiences from other Career Days will be exchanged. Some of the priorities involved, which will vary from Chapter to Chapter, are:

Should other professional organizations participate?
Should the focus be on one university?
Should there be organized workshops?
Is the tie-up with a Student Writing Contest convenient?
Should new student members be "adopted"?
The pros and contras of a Student Chapter
Can internships, buddy days be organized?
Can the Chapter find enough volunteers?

In addition, the PR effect, the "lift" for the Chapter, the role of "information processing specialist" will be debated.

An informal question and answer period will conclude the workshop.

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ABSTRACT

This paper discusses the reasons for a Career Information Day, the format, scope, target audience, timing and setup in a metropolitan area with many colleges. It deals with the motivation of volunteers, innovative methods involving mailings and telephone trees without committee work. It discusses budgets, actual costs and grants. It describes PR efforts, coverage and discusses details as the student writing contest, giveaways, awards, speakers, preregistration and parking. Mistakes are discussed and conclusion drawn for future projects. Repercussions continue: New members, new jobs, and the start of a brand new joint technical communications program by UCLA Extension cosponsored by the Los Angeles Chapter, STC.

Why a Career Information Day?

Undergraduate students in the liberal arts need guidance for a possible career change. During a recession, graduate students have trouble finding work in their fields. There are not enough programs leading to a degree in technical communication. The average college does not offer sufficient data about technical writing and related professions. STC is uniquely qualified to provide such information. The Los Angeles Chapter provides free employment and referral service to members. Together with the neighboring Orange County Chapter the organization covers a large area with excellent employment opportunities in aerospace, banking, defense, electronics, hardware and software.

Moreover, California has 1100 of the total of over 7000 STC members. Though the Los Angeles Chapter has close to 300 members, it has not reached out sufficiently into the giant Greater Los Angeles area composed of some 80 communities. During the last five years, there was little or no contact with academia. Finally, a Career Information Day was seen a the perfect opportunity to revitalize the Chapter under a good cause, to bridge the generation gap, to attract new members, and to put STC on the map with a different PR approach.

The prestige of the University of California was an essential factor in planning the event; the co-sponsorship of the UCLA Placement & Career Planning Center and the UCLA Alumni Association provided us with professional expertise, plenty of free help and free use of appropiate campus facilities, the indispensable ingredients of success.

Format

It was assumed that undergraduate students - the prime target audience - tend to view regular, "rigid" structured seminars and conferences as "stiff". Furthermore, their time is limited as well as their attention span. The students are fully involved in studies; sometimes sceptical in regards to job fairs staged on campus, they told about unfulfilled job promises. They are bombarded with all kinds of information and have often trouble sorting out the relevant data.

From a marketing communication standpoint our event was up against tremendous odds indeed. Recruiters from large private companies have large amounts of money to stage job fairs on campus and/or to attract students to similar events off campus, always with a tangible goal of an excellent job. The L.A.Chapter operates on a shoestring and with volunteers only. Furthermore, we would offer an intangible, the possibility of a career change with a distant job goal. Originally. UCLA authorities were quite sceptical, in part as STC was an unknown entity for them at the time. Had they known that our original budget amounted to a mere $ 500, their belief in the feasibility would have been shaken.

Though the event was open to a secondary audience of graduates, alumni, placement directors, faculty and staff, a very loose program without formal sessions and workshops was planned; an open-house environment with plenty of personal interaction. Details were not announced before the opening. Participants were handed a program with the names of speakers. Plenty of giveaways, lots of literature, an air of improvisation characterized the first Career Information Day organized by the Chapter. The emphasis was on information.

Scope

The original plans called for a top university as key location. The University of California, Los Angeles (UCLA) was the obvious choice. In addition, some 16 other universities were to be included. UCLA alone, with some 19,000 students in the humanities would have been a large target audience. It was decided to reach out to a larger area, however, and many responses to our first mailing motivated us to expand regionally to include up to 100 colleges and universities in a 100 mile radius, with community colleges added at the end.

A student writing contest organized in conjunction with the Career Day was open to all qualified students in Southern California; participation in the event was not required. The contest was intended to link students from far away to the event.

Timing

The date of Friday, May 20, 1983, was selected together with UCLA officials. It did not interfere with finals on campus or other events. For STC, it offered the opportunity to involve "old" officers and newly elected ones to cooperate, to show continuity of leadership during the election transition time. Finally, some of the best price-winning AV and publication material from the ITCC could be shown. The May date also offered the longest possible planning schedule within the one year period during which the elected administrative council was in office.

Organization - Motivation - Management

The author has been active on Chapter level as an elected officer for five years, since 1982 as President of the L.A. Chapter. With the exception of the highly successful ITCC organized in Los Angeles in 1979, the chapter had not organized any local or regional activities beyond some highly successful dinner programs. We did not have any publication or art competition, nor workshops or co-op programs with any university. San Diego and Orange County, though smaller, had been quite active and successful.

Personally, I felt a need to motivate many of our senior members who had withdrawn, to attract young and new people in the middle of a recession, and to bridge a obvious generation gap within the membership.

As the decision to try an experiment, as it was baptized originally, was mine and only mine, I assumed all responsibility from the start, using untried methods. For the same reason, the following is described in the first person by the author.

Getting Involved is Getting Motivated

I started the first mailing to selected potential participants alone. On this January 1, 1983, I tried to reach some selected STC members, going beyond chapter boundaries, and beyond membership also. I acted subjectively, by instinct, without keeping records, without phone contacts. One month later I had a 31% response and 49 volunteers signed up.

At this point I decided to implement the project and to "go public". Somehow I was sure of the success. For two months I did not even approach anybody at UCLA though I mentioned the university in my mailings. I do not recommend such an approach to others though it worked for me - beautifully. There is a lesson to be learned, I believe: I have learned from Helen Caird, a past president of the Society. Helen is the only speaker whom I have heard, and followed with fascination, who has spoken about the role of instinct, who has convinced me that I was right in doing away with procedures. Many women may agree but Helen has formulated her ideas of leadership so well that she motivated me in a maverick role.

As the originator of the event, I was able to argue successfully in favor of certain key features. I wanted a Career Day with free access for all; I did not want typical committees and extensive paperwork. The Southland has large commuting distances, volunteers would be willing to help if such task would not involve travel over long distances. Without any experience in such an event, I decided to create a steering committee which existed on paper only and was a failure. A workshop drew a few people and did not work either. I believe that I tried a compromise with conventional methods. The amazing fact is that the whole Career Day organization was made possible without a single special meeting except for the regular monthly meetings of the Administrative Council of the Chapter which were extended to such effect and except for two conferences with UCLA officials.

Managing Volunteers through Mailings

I am convinced that this facet is the most important feature which made the event a success.

One mailing went to newsletter editors/ STC members/selected potential volunteers; the second to university placement directors and the third one to student newsletter editors. The positive results were input into a computerized listing which became the base of volunteer data. Alphabetized, coded by counties, it produced mailing labels and detailed volunteer information. I had sent out a very detailed questionnaire, intended to pin a volunteer down to a specific task or tasks, selecting from a long list of questions. I was criticized for a form which seemed to be too long; I tried a sign-up list at a meeting which resulted in many names and phone numbers without any indication about the interest of the volunteer. Too many persons for costly telephone follow-ups. The final volunteer list had 101 names.

In the implementation phase, after 3/15/83, I proceeded to delegate responsibilities and to assign tasks, mostly by mail, without any objection. I tried to have two persons for each task; Dr.Jim Goshorn became my representative and the only contact to UCLA. Regional coordinators were named for each county. Others assumed responsibility for booths arrangement. PR, the special issue of the newsletter with cartoons from other chapters; salary surveys, employment, buddy days, internships, scholarships, graphics, publications, software documentation, technical translation, freelance writing, writing courses/programs, newsletters and membership/materials.

The James West Center on the UCLA campus was an ideal setting. A modern structure with close-by parking, it offered us a large, two-level auditorium as the main room: the President's Board Room across the main entrance was used for the AV show. The sunny adjacent patio was used for coffee breaks and catered noontime food service. We had 150 reserved parking spaces, with preference given to car-pooling parties coming from farther than 60 miles.

Telephone follow-up became the main tool to reach volunteers and participants now. Each volunteer was assigned a college in his/her area and given copies of PR material sent. The person, preferrably an alumnus, should make 5-10 calls. At the end, we concentrated on some 60 universities.

Student Writing Contest

The contest offered three prices in U.S. Savings Bonds and books by well known STC authors donated by the writers (Herb Michaelson, Prof. Thomas Pearsall and Dr. Edmond H. Weiss). The contest deadline was 5/6/83. The winners attended a separate ceremony on June 25, with the luncheon and travel expenses paid by the Chapter.

Special Technograph Issue

This edition of the chapter newsletter was handed out during the event. Selected cartoons were intended to show a different aspect of technical communication. Many book reviews were included.

Public Relations

The Career Day was publicized in the largest area newspaper, the Los Angeles Times, in the campus student newsletter, and in other media. The Times provided the keynote speaker, Charles Champlin. Career placement directors were the best promoters of the Career Day.

Miniposters were distributed on campus and sent to volunteers. The "Puzzled" poster theme was reproduced on buttons for volunteers who also had other, "ASK ME" buttons. Giveaways included balloons and a bumper sticker in the blue and yellow colors of UCLA. The text? "TECHNICAL WRITERS DO IT ON-LINE", and below, smaller, the STC logo and "Society for Technical Communication". It was a hit.

The Budget

We spent a total of $ 1300 from Chapter resources plus $ 1000 in the form of a merit grant from STC international. We received considerable company support which took care of much of mailing and printing costs. It is difficult to attach a value to such services but $ 1500 would be a good estimate. We could have handled the event with $ 1000 only, however, by eliminating bumper stickers, balloons, food service and the AV show. None of the speakers charged a fee. Three budgets with different priorities were prepared. Participants had to pay for parking only - $ 2.

The Big Day

Planning pays: Everything went smoothly. There were no parking problems. Most participants came early, with attendance tapering off on a Friday afternoon. My key priorities had been: No booth must be unattended, and volunteers must never run out of literature. Together with Dr.Goshorn, I acted as the coordinator. The event opened at 10 AM; the keynote speaker talked at 11 AM, followed at hourly intervals by other speakers who were limited to 10 minutes each. The topics were: Writing/editing, audiovisual media, translation/interpretation, freelancing and graphics. Information about many other fields was available at the booths.

Food is very important. Thanks to the Society grant, we could offer free "Junior Executive Sandwiches" to the working volunteers at lunch time, served in shifts on the patio. This last minute offer (volunteer could choose something by mail ahead of time) was interpreted as a small sign of gratitude by the Chapter and helped also to find out which volunteers would come. Free beverages and coffee were also available, but outside the main rooms. Breaks were needed, and appreciated. Shortly before closing time at 4 PM, a drawing from new student applications was held, and all new student members were "adopted", in part thanks to non-members. We estimated the attendance in some 350.

Volunteers are the lifeblood of success. Active ones worked on campus, passive ones performed many duties before the event. They publicized the Career Day in distant areas, donated books, selected cartoons. A list with all their names was published in the special issue of the Chapter newsletter, the Los Angeles Technograph. I cannot mention them all here though I should. Never before have we been able to broaden the base so much, to unite members and non-members alike.

Results

Positive results are many. The Chapter got a "lift" with many new members and student members. Our image changed completely. UCLA officials congratulated me and inquired about jobs. Though we had jointly agreed not to publicize job availability at all, my own company has hired two valuable employees as a direct result and offered six internships to language majors. The PR effect continues and extends still. Participants from far away would spread the word on their campus. I keep getting phone inquiries from teachers and students since then. People came from places as far as Monterrey in Northern California to San Diego, 100 miles South of Los Angeles. The news of our success reached as far as Washington, though I cannot explain it.

The most recent event - a direct consequence - was possibly the most significant one. UCLA Extension representatives contacted me in December of 1983: Extension and STC have begun joint planning of a new technical communication program. UCLA Extension, which receives no State tax monies whatsoever, provides the most extensive array of continuing education programs (some 4500 a year) in any community in the country. STC will collaborate in curriculum design, networking, pinpointing of career opportunities, and establishing criteria for certification in specialized areas. STC hopes to cooperate closely with UCLA extension. Ultimately, it will recommend qualified instructors.

There were negative results, too. I believe we concentrated too much on undergraduates and we should have directed efforts more toward graduates. Our newsletter was put together too quick, too late, it lacked style and substance, I had tried to do too much. The AV show turned into a workshop with fewer participants instead of the nonstop show I had envisioned. This was not bad, it was different. The very loose format had the disadvantage that we did not get a complete list of names with addresses. No student Chapter was formed; we did not follow up enough with students. We could not get employers involved and attempts at internships were almost useless.

Summary and Suggestions

Many Career Days have been staged across the Nation, often in a different format. I do not pretend to have the best solution, just a different one. Any approach should be designed according to regional conditions. President Mazzatenta's annual seminars are beautiful. The Rochester Chapter has started an exceptional co-op program. Career days are being held at individual universities in Orange County, California.

They can be organized together with other professional societies, they can involve workshops. There is no single solution.

In Southern California, I tried to reach out far, to draw many participants from all college levels. to involve old and young, new and old members. With over one hundred volunteers and very little money, I proved that it can be done.

A final, personal comment: Maybe the biggest challenge for me as a manager was the motivation of so many volunteers. I could not hire or fire them, they did not get any raises or fringe benefits, they were dispersed over a large area and any time spent by them and me was stolen time, with employment tasks always the priority. Such task was difficult but rewarding indeed for me. I was forced to do away with procedures, smile a lot, be flexible and relaxed. I have learned a lot, having to motivate people with warm words, learning to motivate through technical and human communication.

Where do we go from Here? The Education and Research Special Interest Committee

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ABSTRACT

The author of the mission statement for the Education and Research Special Interest Committee discusses the rationale and potential of the many facets of the E&R SIC and the implications of the programs on international education and research in technical communication. There may also be long term effects on the organizational structure of the STC

E&R SIC MISSION STATEMENT

Goals

The goals of the E&R SIC are:
* Serve the goals of the STC
* Promote and recognize excellence in education and research
* Stimulate original and innovative thinking, teaching and research.
* Through publications and data, increase members' understanding of what is going on in education and research in technical communication,
* Improve members' teaching and research skills,
* Establish a forum for the exchange of ideas and mutual concerns among members, business, industry, and government.
* Recruit members,
* Provide, upon request to the E&R SIC, information on standards for courses, curricula, and programs in technical communication.

Role of panelists

Each panelist will discuss and explore the implications of a specific item in the list of E&R SIC acivities. We hope that those who attend will become participants in the E&R SIC and offer their ideas.

ACTIVITIES TO ACHIEVE COMMITTEE GOALS

At this writing, the mission statement provides for the following activities:

1. Upon request,
a) to supply information about programs and courses (textbooks, syllabi) in technical communication,
b) to act as a clearing house for sample syllabi, course descriptions, and program proposals for technical communication,
c) conduct seminars in research methods.

2. Maintain awareness of technical communications research, listing work in progress, work sompleted, and names of researchers and their special interest areas.

3. Advise chapters, on request, on conduct of local technical writing contests in schools.

4. Provide support to local, regional and international conferences:
a) work with the ITCC Program Committee, on request, to select the stem manager and run the Education and Research stem of the ITCC,
b) provide moderators for panels,
c) review proposals and papers for the ITCC, and other E&R stem manager functions that are part of an ITCC.

5. Referee, on request, manuscripts by STC members for publication, and propose publications to the Publication Development Committee.

6. Publish an E&R newsletter or news column.

7. Provide a directory of teachers, both inhouse and on campuses, listing specialties and availablility for consulting.

8. Recommend, on request, STC representatives to conduct programs and to present papers at conferences or organizations whose interests are similar.

9. Publicize committee activities in scholarly and association journals to create interest and encourage membership in STC.

10. Cooperate with other special interest committees in areas of mutual interest.

11. Assist in managing and conducting special interest and regional workshops, seminars, and programs on education and research.

12. Encourage foreign governments and granting agencies to include technical communications teachers and researchers among Fulbright grant and other international exchange programs.

13. Pursue other activities which the STC Board and the committee managers and members feel are appropriate to the achievement of the Society's goals.

Recent Research in Technical Communication II

Thomas E. Pinelli, Moderator

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A goal of any discipline is the expansion of knowledge or the "systematic quest for knowledge" which is derived in part from the process known as "research." For a discipline, any discipline, to gain recognition and acceptance, members of that discipline must apply the scientific method to analyze relationships among the problems common to the discipline. From the application of the scientific method, a general body of theory will develop. Once a general body of theory is developed, substantive research questions can be systematically generated and tested. The papers presented by the panel members illustrate how the scientific method is being applied and used effectively in the field of technical communication. For the most part, the papers can be classified as applied research in that their purposes are specific and are generally aimed at solving practical problems or at the discovery of new knowledge that can be utilized immediately in actual "real world" situations.

"Improving Documents With Multiple Field-Test Groups"

Susan Bagby describes a small field test of two bilingual brochures designed to give parents an overview of a special academic program. The test methodology includes four reviewing groups -- three composed of users of the brochures and one composed of non-users. The paper discusses the test results in terms of the reviewers' biases and their widely differing responses and in terms of the implications for field tests as a whole.

"A Method For Researching Comprehension Problems In Technical Writing"

In his paper, Thomas Jacobson presents a method which can be used to analyze and evaluate technical documents with regard to writing problems leading to reading difficulty. This method utilizes the participation of the reader as a respondent who, in turn, "signals" certain types of problems by actually marking the text. These "signals" are tabulated by word, sentence, and paragraph and can be used to revise and improve the text during the revision process.

"Relationships Between Size Of A Report's Distribution List And Other Report Characteristics"

Robert Kelton's paper describes how correlation analysis and multiple regression analysis can be used to determine the extent to which the length of a report's distribution list is a predictor of other characteristics of the report or of the report's author. The paper concludes with a discussion of the implications for the teaching of technical writing and with recommendations to professional technical writers.

"Preference On Technical Report Format: Results Of A Survey"

Thomas Pinelli discusses the results of a study which used survey research techniques to obtain feedback from engineers and scientists regarding their preferences on technical report format. While limited to NASA technical reports, the results may have implications to editors and document designers who are involved in setting editorial policies and making decisions regarding format, layout, and organization.

The Internal Report in Complex Organizations

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Statistical analysis of variables associated with writers, readers and documentation can answer the pressing need to describe the peculiarities of internal reports in complex organizations and to diagnose weaknesses in the communication system. This paper describes a test of one such analytic method, indicates its virtues and failings, and assesses its potential value to writers, documentation control officers, communication theorists, and providers of training in technical writing.

INTRODUCTION

This study is based on a survey of writing practices in a large, technological organization which has, over the past three years, provided training in technical writing to 600 employees. The study grows out of two sets of related questions.

The first set asks how the structure of a particular bureaucracy affects the internal flow of written communication. It seeks to identify the features that best describe writers, readers, and the ultimate character of the documentation that connects them.

These questions are largely inspired by T. J. Allen's seminal study, Managing the Flow of Technology. Surveying as he does both oral and written communication, and communication flowing into and out of the organization as well as within it, Allen dwells only briefly on unpublished reports, challenging us at the end of his discussion with this:

> The importance of the unpublished report and some of the peculiarities in its pattern of dissemination should clearly make it a subject of great interest to communication research. There is much to learn about this important vehicle, and research should be directed toward determining its precise function and the roles of various mediating agencies in its propagation.

In one sense, then, this study is an attempt to take up Allen's challenge and to focus on the flow of informal written communication. As will soon be clear, however, we shall ignore some parts of the challenge in favor of greater understanding of other parts. To understand the flow of information within the organization, we shall not endeavor to analyze the kinds or sources of information flowing into or out of the organization. Similarly, to encompass as many forms of internal documentation as possible, we shall ignore some basic questions about the functions this documentation serves. The rationale for these priorities will become clear in the following sections of this paper.

This study is not the first, of course, to take up Allen's challenge, and a later report will compare the data reported here with data reported elsewhere in the literature of organizational communication.

The second set of questions providing impetus for the current study centers on the need of the technological organization to monitor the quality and quantity of its writing. The communication audit is one method by which such monitoring goes on. Yet the audit generally takes into account the same broad range of issues addressed by Allen and thereby fails to provide clear accounting of the state of the written word. For lack of such accounting, many companies simply assume that they have problems in technical writing and call in the consultant to offer remedial training.

As one such consultant, I have long sought means by which I might learn quickly something about the scope of the writing going on at a client company—means by which I might identify from afar the specific difficulties experienced by the writers I am called on to train. In short, I have been looking for tools that will both describe and aid in diagnosis.

As I have imagined it, the problem is analogous in some ways to that faced by the physician, whose prescription for an ailing patient is often based on the descriptive and diagnostic value of blood tests.

Such tests are, of course, the result of decades of research, with, no doubt, some art obscured by the seeming precision of the science. But why not a blood test for technical writing? Why not tools to help us describe, as Allen urges us to do, but also to diagnose and prescribe? What would be necessary to their devising?

This study has been an effort to establish such tools. And the research design described here is as much the subject as the results achieved by that design. The goal, in short, has been to describe the state of technical writing at a particular company and to use the descriptive data as an aid to diagnosis.

of possible weakness in the communication system—all with an eye toward prescribing appropriate remedies.

The following sections describe the research design and the data collected.

METHOD

The 122 participants in this study are professional and managerial personnel at a midwestern power company. The company itself employs slightly more than 12,000 people, of whom approximately 20% are professional or managerial.

All participants had been assigned or volunteered to take a two-day training program in technical writing sponsored by the company's Department of Human Resources. Participants' motives were varied. Some participants perceived weaknesses in their writing and wanted help; others were assigned to the program because their managers perceived weaknesses in their writing. In some cases, managers had simply decided to provide simultaneous training to all professionals in a department or division. The variety of motives for participating suggests that the sample is fairly representative of all professional and managerial personnel at the company, but none of the discussion below assumes that the results can be generalized beyond the sample itself.

In all, 220 professional and managerial personnel of the company were scheduled to participate in the technical writing programs in late spring 1983. Of these, 197 submitted a sample report before the course and completed copies of the questionnaire. However, 75 of the questionnaires were unuseable, in most cases because the respondent omitted data crucial to the statistical analysis. Thus the study is based on 122 responses to the questionnaire and on the sample reports submitted by these respondents.

Useable responses represented the following departments within the company:

Department	Number of Responses
Accounting	26
Construction	20
Customer Services	17
Energy Supply	48
General Services	11

Procedure

Eight weeks in advance of scheduled training in technical writing, all participants received a two-page questionnaire that is the basis for this study. The instructions asked participants to choose from their files a document they had written recently—one that represented in length, format, and complexity the kind of writing they typically do for the company. As indicated below, most items on the questionnaire apply specifically to these documents from the respondents' files.

Respondents were requested to mail to me the questionnaire and the document on which their answers were based.

The Questionnaire

The questionnaire included fifteen items relevant to the present study. The documents submitted with the questionnaires yielded an additional two items of relevant data. The items on the questionnaire may be grouped as follows:

> Characteristics of the Writer (4 items). These questions asked respondents to indicate the extent of their formal education, the number of years they had been working for the company, and the number of years they had been writing letters, memos, and reports. Respondents were also asked to indicate whether they had ever had training in technical writing.
>
> Characteristics of the Reader (8 items). The first of this group of questions asked respondents to indicate how many people received or would receive copies of the document. The next three questions asked how many recipients of the document were above, below, or level with the writer in the corporate hierarchy. Respondents were told that the sum of their answers to these three items should be equal to the total number of recipients. The next four questions asked respondents to indicate how many of the total number of recipients of the document were (1) approval readers, (2) action readers, (3) transmitters, and (4) FYI readers. Approval readers were defined as those having the authority to accept or reject the content of the document; action readers as those who respond to the decisions of the readers at the approval level; transmitters as those who route the report to the approval level; FYI readers as those who receive the report for information only.
>
> Writer's Power Over Distribution (2 items). These asked respondents to indicate whether or not they determined the distribution list and whether or not the list was compiled before writing began.
>
> Characteristics of the Document (4 items). Under this category were gathered data on the number of pages of the document's text and the number of pages, if any, in the document's appendixes or attachments. Respondents also indicated how many hours they spent writing the document and whether or not the document was revised or edited by someone else before distribution.

Data Analysis

Responses to the questionnaire were coded and statistically analyzed to derive means, standard deviations, and a matrix of correlation coefficients for all of the variables for which data were gathered. By convention, coefficients of correlation are reported in the range +1 to -1. The nearer to +1 or -1, the stronger the correlation between variables. All correlations cited here have been determined to be significant at a 99.9% confidence level.

DATA ASSOCIATED WITH EACH VARIABLE

The Writer

Table 1 provides mean values, standard deviations, and range of variation for the variables describing the writers under study. The highest level of education reported was the master's degree. For most participants in the study this company appeared to represent their first and sometimes only employer, and it is interesting to note that the number of years of writing experience lags only slightly behind the number of years they have worked for the company. Not indicated in the table is the fact that only 20% of the respondents had prior instruction in technical writing.

TABLE 1
CHARACTERISTICS OF THE WRITER

	Mean	SD	Range
Yrs. Educ. Beyond H.S.	3.6	1.5	0 -6
Yrs. Employment at Co.	10.3	9.0	1-36
Yrs. Writing Reports	9.3	7.7	0-35

The Document

Table 2 summarizes data for variables associated with characteristics of the documents under study. Here, as in later discussion of characteristics of the reader, range of variation seems as significant as the other data reported. What emerges is a picture of great diversity in terms of report lengths and distribution practices.

TABLE 2
CHARACTERISTICS OF DOCUMENTS

	Mean	SD	Range
Length of Documents (pp)	9.2	16.5	1-109
Total Writing Time (hrs)	20.2	43.0	1-319
Hours per page	3.0	8.2	1- 79
Pages per reader	1.0	2.3	0- 17

The Reader

Table 3 indicates the total number of recipients of the document as well as the way distribution is spread across the corporate hierarchy and across lines of anticipated reader response (or power over the document). Numbers in parentheses indicate percent of total number of recipients.

TABLE 3

CHARACTERISTICS OF READERS

	Mean	SD	Ran
Total Distribution	28.6	70.8	1-600
In Hierarchy			
Readers Above	10.0 (35%)	14.3	0-102
Readers Below	11.0 (38%)	55.8	0-500
Readers Level	7.6 (27%)	22.0	0-175
In Power			
Approval Readers	3.7 (11%)	11.9	0-125
Action Readers	14.6 (50%)	53.6	0-500
Transmitters	2.5 (8%)	4.5	0- 36
FYI Readers	9.5 (31%)	24.8	0-216

Variables as Function of Appendix

The presence or absence of an appendix or attachments was a readily apparent feature of each document that could be examined for correlation with other variables under study. Table 4 compares all documents, documents with appendixes, and documents without appendixes in terms of other features of the document and its intended readers.

CONCLUSIONS

The Composite Writer

Based on the means assembled above, and limiting our vision for the moment to those writers under study, we can imagine the composite writer in the following way:

> With three to four years of college education, he is one of approximately 2400 professional or managerial personnel in a public utility employing a total of 12,000 people. He has worked for the company about 10 years and has been writing letters, memos, and reports almost as long. It is unlikely that he has had any prior training in technical writing.
>
> The documents he writes for internal distribution are about 10 pages long and his writing time per page is about 3 hours. About half of the documents he writes will be revised or edited by someone else, and about one-third of what he writes will include an appendix or attachments.
>
> The 29 people who receive the documents he writes include readers above and below him in the corporate hierarchy in almost equal numbers, with readers level with him representing a slightly smaller proportion. The writer anticipates that over half of his 29 readers will take specific action based on the document's content; 2 or 3 will serve as approvers, 2 or 3 as transmitters, and the remaining 9 or 10 as FYI readers.

Refinements

When we compare documents that include an appendix or attachment to documents without appendixes, we see the following changes in the composite sketch:

1. The document with appendix is nearly six times longer than the document without.
2. The writing time per page for documents with appendixes is only half that of documents without appendixes.
3. Documents with appendixes are distributed to only 2/3 as many readers as documents without appendixes.
4. Documents with appendixes reach the desks of a slightly smaller proportion of readers at the approval level than documents without appendixes.

TABLE 4
MEAN VALUES FOR SELECT VARIABLES ALL DOCUMENTS, WITH APPENDIX, AND WITHOUT APPENDIX

	All Docs. (N=122)	With App. (N=31)	W/O App. (N=91)
Length of Documents	9.2	21.5	4.0
Total Writing Time	20.2	30.0	16.9
Hours per Page	3.0	1.6	3.5
Pages per Reader	1.0	2.5	.5
Total Distribution	28.6	22.2	30.8
In Hierarchy			
Readers Above	10.0 (35%)	8.4 (38%)	10.5 (35%)
Readers Below	11.0 (38%)	9.5 (42%)	11.5 (37%)
Readers Level	7.6 (27%)	4.5 (2%)	8.7 (28%)
In Power			
Approval Readers	3.7 (11%)	2.2 (10%)	4.2 (12%)
Action Readers	14.6 (50%)	12.5 (53%)	15.3 (50%)
Transmitters	2.5 (8%)	2.0 (8%)	2.6 (8%)
FYI Readers	9.5 (31%)	7.1 (29%)	10.4 (30%)

Further Refinements

And, finally, when we factor in significant correlations of variables (not shown in the tables), we can refine our composite in these ways:

1. The larger the number of transmitters receiving the report, the longer the document itself is likely to be.

2. Though readership at all levels in the corporate hierarchy rises as the number of recipients increases, total distribution is most significantly correlated with the number of readers below the writer.

3. As the total number of recipients increases, so does the number of transmitters, FYI readers, and action readers, with total distribution most significantly correlated with readership at the action level. The number of readers at the approval level appears to remain relatively constant—typically 2 or 3, regardless of the size of total distribution.

4. The action reader and FYI reader are typically below the writer in the hierarchy, the approver is typically above. Transmitters appear in equal numbers above and level with the writer, but rarely below.

IMPLICATIONS

Descriptive Value

For the provider of training in technical writing, the descriptive value of this study should be clear. The composite sketch derived from the data can aid in decisions about the general content as well as the specific points of emphasis for the training program. In the organization under study, for example, the trainer would be most likely to stress the importance of brevity in the executive summary (based on the number and position in the hierarchy of the approval readers), and the need for simply stated imperatives in the discussion sections (based on the number and position in the hierarchy of the action readers). Given the large number of FYI readers each document faces and the relative infrequency of documents with appendixes, training would necessarily need to emphasize the rhetorical advantages to be gained by inclusion of an appendix.

Beyond clues of this sort that help the trainer prepare his program, we find that the data themselves, taken in composite form or discretely, can serve the function of a mirror held up to the participants in a training program. One effect is to prompt from participants additional information useful to the trainer. For example, in announcing the whopping number of FYI readers for each report written, the trainer may learn of something in the structure of the organization that makes such distribution seem necessary. In the case under study it was by this means that my vivid impression of the Theory X management style of the company emerged.

Given the descriptive value of the data we have, the gaps seem all the larger. We have certainly identified some of the peculiarities of corporate communication, as Allen has urged us to do; but as much remains obscured as has been illuminated. We could learn a good deal, for example, from data on the purposes or functions the writers intended their documents to serve: What proportion of the documents were intended to aid in direct solution of a technological problem? What proportion were designed to establish or reinforce procedure? What proportion relayed information associated primarily with definition and maintenance of the operational environment? Answers to these questions, especially when correlated with some of the other variables of this study, will surely improve the descriptive value of the present research design.

Diagnostic Value

One overwhelming fact limits the diagnostic value of the data reported here: The norms remain to be articulated. Lacking any kind of data base from which to generalize about norms, we are in no position to identify specific difficulties in the system of written communication in the organization under study. The trainer's intuition, based in part on experience, may lead him to recommend attention to specific aspects of distribution with an eye toward reducing the length of the documents generated and the length of time devoted to document writing. But without clear knowledge of the norms for such variables, and the ability to infer prescriptive norms from descriptive ones, the trainer cannot say whether the weaknesses in the communication system are real or imagined.

Improving Documents with Multiple Field-Test Groups

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The article describes a small field test of two bilingual brochures designed to give parents an overview of a special academic program conducted by the Las Cruces (New Mexico) Public School system. An explanation of the test methodology includes a description of the four reviewing groups--three composed of users of the brochures and one composed of non-users. The article discusses the test results in terms of the reviewers' biases and their widely differing responses and in terms of the implications for field tests as a whole.

Technical writers frequently perform field tests by having representatives of the intended audience review and respond to a trial version of a document. The philosophy behind such field tests seems to be that representatives of the intended audience will provide the best test of the document. However, audience representatives may view the document's subject matter with a bias. And that bias can render their test responses useless for the technical writer who will revise the document.

In a recent field test of two bilingual brochures for parents of children in the Las Cruces (New Mexico) Public School system, I found that the biases of representatives of several user groups limited the usefulness of their test responses. Also, their test responses yielded few concrete suggestions for improvement. On the other hand, the responses of an impartial group of reviewers provided substantial and valuable revision assistance. The test results imply that for technical writers seeking to improve a document, field test reviewing groups composed solely of representatives of the intended audience may not provide the best revision assistance.

METHODOLOGY

The Special Student Services Office of the Las Cruces Public School system asked me to develop two new bilingual publications to give an overview of a special academic program to the parents of public school children. They wanted the publications to replace an existing but ineffective program information booklet. The two brochures that I wrote were an attempt to provide concise and accurate information about the program to an English- and/or Spanish-speaking audience representing all educational and intellectual levels.

To determine the clarity and accuracy of the brochures and the effectiveness of their format and style, I conducted a small field test with help from the director of the program I had described. The program director helped me assemble a test population consisting of four distinct groups:

- English-speaking parents of children served by the program,
- English-speaking staff members from the Special Student Services Office,
- Native Spanish-speaking staff members from the Special Student Services Office, and
- English-speaking students of writing with no connection to the program.

Altogether, 25 people reviewed the two brochures: five parents, nine staff members, two Spanish speakers, and nine writing students.

Either the program director or I gave all 25 reviewers copies of the existing program information booklet, an English version of both new brochures, and a Spanish version of one of the new brochures. Reviewers had approximately one week to read and study the documents. We encouraged them to make as many comments and changes on their copies as they wished. At the end of the week, they returned the documents and completed a simple, one-page, English-language questionnaire. The questions dealt with the content of the brochures, with the development of the subject, and with the style and format of the brochures.

My main objective was to learn whether or not the brochures provided parents with correct information about the program in a clear and direct manner. But I also hoped the test would yield concrete suggestions on which to base revisions. In particular, I expected to base most of my revisions on the parents' responses concerning clarity and format; the staff members' responses regarding content and accuracy; and the Spanish-speakers' recommendations concerning the tone, grammar, and word choice of the Spanish version. I expected that the most useful comments would be those of the parents, the brochures' intended audience.

RESULTS

I obtained written questionnaires and manuscript responses from 23 reviewers. The other two reviewers, the Spanish speakers, discussed the brochures with the program director.

Response to the Questionnaire

The overall response to the questionnaire was generally positive. The responses of parents were the most positive. Parents indicated that the subject was well explained and they offered few suggestions for improvement. Staff members were slightly more critical but in general their questionnaire responses were also positive. They were willing to suggest items that should be included or changed. Some staff members also expressed very strong feelings that the brochures should be bilingual.

The writing students, while also generally positive, gave the most critical questionnaire responses. In many instances, especially those regarding the brochures' content and its organization, the student responses contrasted sharply with those of the staff reviewers. In questions of format, the students came close to agreement with the parents.

Response to the Manuscript

The responses and criticisms written directly on the copies of the brochures were less positive than the questionnaire responses and contained more detailed and specific suggestions for improvement. However, very little criticism came from the parents.

Far from expressing dissatisfaction with the brochures, the parents echoed their positive questionnaire responses by frequently indicating in marginal notes how much they liked the new brochures. They made very few critical comments and confined their changes to correcting typographical errors and excising certain sentences.

The written comments of staff members revealed the same dissatisfaction with the brochures as did their questionnaire responses. They pointed out several errors in descriptions of the program's procedures and policies and suggested including much more detail. They also frequently suggested changing the organization of the brochures. The staff members particularly expressed displeasure with the manuscript's lack of educational terminology. They replaced certain words with the terminology they preferred and rephrased certain sections of the text.

Mirroring their less positive questionnaire responses, the writing students' comments contained the most numerous and extensive suggestions for improvement. The students, who agreed with staff members that the brochures would be improved by a change in organization, frequently indicated exactly how the text should be altered. They addressed the subject of tone and strongly suggested personalizing the brochures by using the second person, a choice contrary to the preferences of the program director. Some students carefully noted where all the changes in person should occur. The students also addressed word choice, frequently changing words they disliked.

Response to the Spanish Version

The two native Spanish speakers responded negatively to the Spanish version of the brochure. They told the director that the purpose of the brochure was not apparent and that the brochure was hard to understand. They also suggested a change in tone.

DISCUSSION

The test results indicated that the brochures provided at least the English-speaking parents with information about the program in a clear and direct manner. Also, the results yielded many suggestions for the revision and improvement of the brochures. However, the useful comments did not come from the expected source.

Overall, the parents made very few comments about the brochures except to indicate their pleasure with them. They offered very little criticism. The parents' positive responses have two probable causes. First, the new brochures represented the only clear statement about the program that they had ever received, and second, they already knew enough about the program to unconsciously fill in any gaps in the content. The parents' responses seemed to indicate only that the text was clear and understandable. They did not indicate whether the format was effective or whether the content was accurate or well-organized. In short, the parents' responses yielded very little concrete information on which to base revisions.

The responses of the staff reviewers provided information that was more useful. In particular, they provided some helpful comments about organization and content, probably because they frequently fielded questions from the public and therefore recognized common concerns. However, their familiarity with the program also affected their responses in a negative way. They felt that the brochures were incomplete without the smallest details of program operation. Also, they strongly urged the use of educational terminology that was inappropriate for the intended audience.

Ignoring questions of content, organization, and format, the Spanish speakers focused their responses entirely on the quality of the written Spanish. Their suggestions regarding the tone of the text were valuable, especially considering their awareness of the cultural background of the Spanish-speaking segment of the audience. However, their lifetime use of local forms of the Spanish language negatively affected their responses to the more standard and often more grammatical Spanish used in the text.

Although they were much less positive, the responses of the writing students were extremely thorough. They addressed virtually all aspects of the brochures. The student responses contained very valuable suggestions regarding the organization, format, content, and tone of the brochures. Their thoroughness can be explained partly by the fact that they were being graded on their editing ability. However, I think a more important explanation is that they viewed the document objectively and impartially.

In other words, I had expected the parents to provide the most useful comments because they were the documents' intended audience. But, biased in favor of the new brochures by their dislike of the old publication and by their prior knowledge of the program, they offered fewer useful suggestions than I had hoped. I had also expected the staff members to respond with useful information. However, biased against the new brochures by their familiarity with the program and by their experience in presenting it to the public, they too offered only a few helpful suggestions. Finally, I had expected the Spanish speakers to provide useful information about the Spanish text. But, biased by their use of a non-standard form of Spanish, they only offered helpful suggestions regarding the brochure's tone. The most helpful responses came from the writing students who had no vested interest in the program or the documents and, therefore, no biases. This impartial reviewing group was much more alert to the changes that were necessary than were the reviewing groups with an interest in the brochures' success.

After the field test I revised the brochures. I based my revisions largely on the writing students' responses about all aspects of the brochure, but also on the parents' indications of clarity; the staff members' comments about content, accuracy, and format; and the Spanish speakers' recommendations concerning tone. In short, I based my revisions on selected responses from all four reviewing groups. The quality revision that emerged would have been impossible without the responses of each group. To have limited the field test to fewer groups of reviewers would definitely have lowered the quality of the final product.

CONCLUSIONS

On the basis of this limited field test, I conclude that the greater the reviewers' interest in the subject of the test document, the less useful their responses may be for the purposes of revision. While field tests limited to intended users can certainly help determine if a document does what it was intended to do, such tests do not necessarily help generate improvements to the document. Furthermore, I conclude that technical writers need widely varying groups of reviewers to generate the suggestions that lead to improved documents.

A Computer-Assisted Method for Analyzing Technical Communications

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This paper presents a method which can be used to analyze and evaluate documents with regard to writing problems leading to reading difficulty. The method engages the participation of readers, as respondents, who "signal" certain types of problems in a text by actually marking text that is presented on-line. These "signals" are aggregated across respondents and tabulated by word, sentence, paragraph or whole text. The data constitute a "trace" of certain aspects of the reading process. Problem areas detectable in text are often localized, and can be written and improved upon during a revision process.

Three methods predominate today in research assessing comprehension elements of text readability: formulas, the Cloze procedure, and recall tests. While each is useful in its way, each also has its weaknesses, weaknesses in areas where the proposed method may offer some new capabilities to document analysts and writers. This "signaled-stopping" technique has been tested in a number of fields including science journalism, legal writing and computer software documentation, with promising results. Of particular interest is the technique's sensitivity to non-specialists' problems in reading technical material

In the following, a computer assisted method for signaled-stopping resesearch is described which involves respondent on-line interaction with documentation. The method's use is illustrated through examples.

PAST RESEARCH

A quick review of today's predominate methods suggests some reasons why the signaled-stopping technique may be of use in technical communication settings.

Past research into print communications evaluated "readability" by determining a text's level of reading "ease." The scale of ease or difficulty was usually something like the competency levels associated with different class groups of our education system. Thus a document could have a readability level such that third graders , for example, would be expected to understand its message or messages. The methods used to determine reading ease commonly were readability "formulas." These formulas attempted to measure some dimension of complexity, focusing on attributes such as word or sentence length, amount of punctuation, or the number of clauses, etc. Grey and Leary developed a formula with multiple indicators of this type. (Gray and Leary:1935) Flesch later simplified the approach and developed a formula that determined the ratio of words per sentence to provide its assessment of readability. (Flesch:1951)

There were improvements upon the formula approach, some quite useful. The Cloze procedure, for example, examined text at a more semantic level than readability formulas. Every nth word would be removed from a piece of text and naive respondents were asked to replace these words. The ratio of successful replacements provided a "Cloze score" of the degree of redundancy in, and the reading ease of, a piece of text. (Taylor:1953)

Assessments of the various methods have been published. (Chall:1958; Dawkins:1975; Redish:1980) No review is needed here. Certain characteristic weaknesses of former approaches should be mentioned, however. First, these approaches were generally used only to predict levels of ease. The constituents of ease of difficulty were seldom addressed, though there have been attempts to identify such structural constituents. (Brinton:1958) Sources of variation in readability were not, in general, disaggregated through research except into simple grammatical units. The scientific potential of this theoretic approach was limited, and this limitation may have led to the current lack of interest in "readability" research.

Second, and at a more practical level, formulas can not indicate in particular cases whether a message sent is in fact received. They were not designed to test comprehension in this way, and findings which indicate that a text is "readable" can not imply that its particular message will be received and understood. Such findings can only say that a particular piece of text has a readability level, as measured by formula, suitable for a certain standardized competence level. Yet this piece of text may have problems in logic of presentation, or in a few key vocabulary terms, that largely foil the goal of communicating the desired message to the receiver. As has often been noted, formulas produce the same score for both an intact original sequence of a writer's sentences and a randomly scrambled sequence of these same sentences. Formulas do not, in fact, measure comprehension at all.

More relevant to assessing documentation efforts are comprehension tests of the "recall" type that are sometimes used today. Though they do address comprehension directly, these recall type tests have other weaknesses, however. They do not trace behaviors during the reading process itself, and can not considered sensitive as locators of problem areas in text.

While misunderstanding as measured in recal tests can be used to infer location of problem areas in text, researcher intrusion greatly restricts the utility of the method in this application. In order to design test questions, test designers must assume certain kinds of knowledge on the part of readers, and effective assumptions are difficult to develop. Certain areas of writing suffer greatly from specialists' unreasonable assumptions concerning the general public's understanding of technical terminologies. Computer software documentation and legal writing are two of many examples where technical messages aimed at general readerships commonly miss their mark.

Clearly there is a need for more productive concepts relating to reading comprehension, and for accompanying methods of gathering data on the reading of technical communications. They would be especially useful if they were able to isolate problem areas in text. The remainder of this paper addresses this need, by reviewing the signaled-stopping research concept and a method for gathering stopping data.

ANOTHER APPROACH TO READABILITY

One productive alternative to readability formulas resides in research into "stopping" behaviors conducted by Carter et. al. (1973). What are stops? Stops occur frequently during many communication processes: whenever one must pause to think about a message just received, to think about how to send a message, or when one interrupts someone else to actually send them a message. These are all "stops."

Some kinds of stopping occur in reading. A stop occurs, for example, whenever a reader temporarily stops to ponder a word, to reread a sentence, or to consider a question that has been raised by the text. Frequent stops mean lots of communicative activity. In this sense stops are an integral part of the reading process, and for this reason they can be used to analyze reading. If they can be observed, stops can be used to trace certain aspects of the reading process in detail.

Observation of stops in past research has usually taken the form of self-marking, by respondents, on textual material. Paper and pencil are the media used. Characteristically, respondents are given a small repertoire of reasons to stop, and the stops are to be marked just at those points where they occur. Respondents may be asked, for example, to mark a stop in the text if they stop: to reread, to question something in particular, or to think about what is being communicated in the text. These can be marked with symbols such as /r /q and /t, respectively. Other kinds of stops can be also studied of course. For example, data have been gathered on respondents' agreements and disagreements with statements in a piece of text.

The notion of stopping adds to our previous ability to study reading. Readability formulas use grammatical units to provide us with global measures, assessments of the text as a whole. They provide us with a statistical indication of that class of readers which should be able to read documents of the type measured, if they were to try. Stopping on the other hand provides data on the places where reading difficulties actually occur in real documents. This last capability has practical implications. It means that stopping analysis can be used as a tool for analyzing and revising documents prior to their dissemination. Problem areas detected in a piece of text are often localized and can be rewritten and improved.

Previous research has reported the productivity of the stopping concept. Broberg analyzed accuracy of science reporting using a stopping methodology, and found that ommissions of information in science stories were the commonest cause of reader confusion. (Broberg:1973) Heffner, also studying accuracy, researched the stopping behaviors of student news reporters. She found that an increased number of stops made by writers during their intake of information on a topic was associated with a fewer stops by readers of the stories written by these writers. (Heffner:1973)

One useful study has demonstrated the validity of the stopping construct as a measure of comprehension in the document revision context. Jackson analyzed programmed learning modules, locating areas of difficulty within program units by means of the stopping technique and then rewriting them to improve their effectiveness. (Jackson:1974) Comprehension tests designed for the learning modules were used as an independent measure of comprehension. Jackson found that readers of the rewritten sample units achieved higher comprehension scores.

A COMPUTER ASSISTED STOPPING TECHNIQUE

In an attempt to facilitate administration of stopping studies a "computer assisted" method has been devised. The method is conducted in two stages. First, the data are gathered from respondents in the usual textual form, but "on-line." Second, a computer is used to transform each individual's responses from the textual form, with stops included, into quantitative representations of the stops and their placements, and these are tabulated across respondents.

In the first step, a piece of text such as a computer program description, for example, is presented to each respondent on a computer terminal. Stops are elicited. A word processing package is used for this purpose. The chief criterion concerning which package to use is, of course, "user friendliness."

Terminals are equipped such that respondents have one or more clearly labeled "stopping buttons" to use in marking their stops into the text. When reading the text, if they wish to signal a stop they simply move the "cursor" to the spot in the text where they wish to mark the stop and then push the appropriate stopping button. Cursor movement during recent tests has been facilitated through use of special keypads containing "arrow" keys. The cursor itself can be used to "scroll" the text down the screen. Computer "mice" or light pens can also be used.

Using the stopping buttons respondents insert (over-write) unique symbols into the text. Each symbol is used as a counter for only one kind of stop. The following is an example of a short piece of text that has had stops marked-in by a respondent. The piece was part of a public referendum for the State of Washington in 1982. The respondent has marked a number of stops to question, (represented by the symbol ^), and a number of stops to reread, (represented by the symbol *).

Sample of a "Stopped" Political Initiative

If approved into law, initiative 412 would set the maximum annual interest rate for retail installment contracts at 1% above the federal discount rat^ on 90-day commercial pape^. 12% or $10.00, whichever is the greater.*This maximum rate^ would still apply if the seller transfers its rights to a third party,*even though the third party would be able to charge a higher rate on a direct loan to the purchaser under laws not affected by intitiative 412.

Stops to question were signaled in this sample with regard to the terms "federal discount rate," "maximum rate," and "commercial paper." Stops to reread followed one sentence and one clause.

This data gathering procedure comprises the first step. It results in "stopped" text files equal in number to the number of respondents. The second stage takes these files and does two things to them. The files are first transformed from their alphabetical to a numeric form, each one being treated as a two-dimensional matrix. The resulting numeric matrices have widths equal to the widths of the sample text and lengths equal to the number of lines in the sample text. Each output matrix is composed of zeros except where stops have been marked into the text matrix. In place of the unique stopping symbols is a unique number.

Following this the matrices are tabulated in a form suitable for the desired analysis, by means of a computer program . For example, suppose that a preliminary analysis of text such as the example above involved a simple count of the number of stops at each point in the text, regardless of the type of stop. A computer program can be run that counts each non-zero x,y, coordinate across all the matrices. The result is a single matrix that spacially represents the total number of stops, tabulated at the points where they were entered. The following example is such a tabulated matrix, generated from reponses by 17 students, on the piece of text used above:

Final Matrix: Stops Across All Respondenta

```
oooo2ooooooooooooooooooooooooooooooooooo1oooo
ooooooooooo1oooooooooooooooooooooooooooo2ooo1
ooooooo1ooo1oooooooo1ooooooo3oo1oo1ooo1oooo1o
oooooooo1o1oooooooooo3ooooooo1111ooooooooo21o
1ooo42oooooo12oooooooo1oooooooooooooooooooooo
oooooooo392oooooooooooo11ooo1oooooooooooooooo
oooooooooooo1ooooooooo21oooooooooooooo11oooo2
o332o1oooooooooooooooooooooooooo1o2oooooooooo
ooooooooooooooooooooooooooooooooo2ooooooo1o1o
oooooooo1oooooooooooooooo2o1o1ooooooooooooooo
oooooooooooooo1221o1ooooooooooooooooooooooooo
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Such a matrix can be used in a number of ways. Most simply, it can be used to identify troublesome vocabulary terms by comparing the tabulated numeric matrix to the original piece of text. X,y coordinates that contain an "o" (zero) caused readers no problems. Coordinates containing 1s are generally to be interpreted as resultant from individual differences between respondents. Locations that have values higher than 1 are interpreted as representing problems of understanding, with higher values representing more severe problem areas. X,y, locations can be grouped across columns to some degree, as well, where series of coordinate points cover words or phrases. For example, in the above example, row 6 contains the string of values "33201" which indicates that the meaning of the term "third party" eluded many of the respondents. It is also possible to specify sentences as the unit of analysis, having respondents signal their stops at the end of problematic sentences.

CONCLUSION

Consider some kinds of hypotheses, beyond vocabulary checks, that the stopping technique is suited to address. 1) Two or more presentational logics for the same set of ideas can be represented in different pieces of text. Mean differences in numbers of stops can be tested. 2) A series of paragraphs in a piece of writing can be treated differently with, for example, a successive increase in the average number of elements per sentence. Statistical tests could examine the shared variance between number of elements and number of stops. 3) Attitudinal data can be gathered by utilizing a repertoire of stopping reasons, such as to agree or disagree, that enable the researcher to observe both the places respondents choose to register their opinions and nature of these opinions.

This list of potential applications is not exhaustive of the areas in which the stopping concept can be used. It is meant only to indicate that, as an approach to unitizing communication processes by means of respondents' own behaviors, "stops" provide useful opportunities for observing. Some of these applications cover behaviors which readability research has addressed, others not. Some of them have already been utilized, and cited above. Some are in the process of being researched today.

The computerized stopping approach has its limitations. Certain kinds of documents are more appropriate than others for this kind of analysis. "Stopping" an entire book, for example, would be a costly undertaking. In such cases formula scores and comprehension tests of the recall variety might be more cost effective. On the other hand the computer-assisted stopping technique has a powerful capability, of identifying and locating specific problem areas in text. Particularly for "high risk," important messages, the investment should be worthwhile.

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Preferences on Technical Report Format: Results of a Survey

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ABSTRACT

A survey of 513 engineers and scientists employed at the National Aeronautics and Space Administration Langley Research Center and 600 engineers and scientists from three professional/technical societies solicited the opinions of report users concerning the format of NASA technical reports. The results indicate that a summary as well as an abstract should be included, that the definitions of symbols and glossary of terms should be located in the front of the report, and that the illustrative material should be integrated with the text rather than grouped at the end of the report. Citation of references by number, one-column, ragged-right-margin layout, and third-person writing style are also preferred by a majority of the respondents.

INTRODUCTION

Technical reports vary greatly in content, purpose, and audience; some, such as progress reports, are prepared only for internal use; others may have restricted distribution because they contain classified or proprietary information. The survey described here was concerned only with reports that record significant scientific or technical accomplishments and that are prepared for distribution outside of the originating organization. For example, in 1980 the National Aeronautics and Space Administration published 3,399 such technical reports; of those, 612 were published by the Langley Research Center. The following paragraphs briefly describe the typical NASA technical report.

To promote clarity and utility in its technical reports, NASA employs uniform publication standards.[1] The standards include a basic report format that defines the report components and establishes their sequence. The standards also address, in a limited sense, language (verbal and visual) and presentation (typography, graphic design, and physical media). The standard components of a NASA technical report are shown below, but not all these components appear in every report. For example, most reports do not contain a foreword, preface, or table of contents.

Title page
Foreword
Preface
Table of Contents
Summary
Introduction
Symbol List and Glossary
Description of Research Procedure
Results and Discussion
Conclusion
Appendixes
References
Tables
Figures
Abstract

The average length of Langley technical reports is 76 pages. The publications are typewritten, single-spaced, with a one-column, ragged-right-margin layout. The image area is 7-1/8 × 9-3/16 inches, printed on 8-1/2 × 11-inch paper. Reports are bound by saddle stitching. Illustrative material is usually grouped at the end of the report; however, reports containing only small amounts of illustrative material often have the tables and figures integrated with the text. NASA reports are usually written in the third person. Although most reports contain a mixture of passive and active voice, passive voice tends to be used more frequently. NASA reports contain both a summary and an abstract. The summary, which generally appears on the first page of the report, is designed to be read independently of the report proper and is written as a concise recapitulation of the information in the report. The abstract (up to 200 words) states the purpose, scope, and major findings and is in essence a condensed form of the summary. The abstract is located on the report documentation page, which appears last in the report. Citation of references in the text by number is the preferred format; citation by author and year is optional.

BACKGROUND

As part of a review and evaluation of the Langley scientific and technical information program, the standard technical report was examined to assess its effectiveness as a medium for disseminating information and to identify changes that would increase its utility. Two studies were conducted.

The first study involved a survey and analysis of the technical report in general; it covered current preparation practices, the experimental and theoretical literature, and prescriptive standards and criteria:

- Current practices for preparing reports were determined by systematically analyzing selected reports and related materials obtained from a survey of report producers in government and in the private sector.
- The experimental and theoretical literature pertaining to technical report preparation was surveyed in five manual and machine-readable data bases.
- Prescriptive standards and criteria were obtained from a review of style manuals, publication guides, and textbooks concerning technical writing and editing, verbal and visual presentation, typography, and graphic design and layout.

The results of this examination are presented in NASA Technical Memorandum 83269.[2]

The second study involved a survey of users of NASA technical reports to determine their preferences and attitudes concerning format (organization) and other editorial and layout considerations. The results of this survey are presented in NASA Technical Memorandum 84502.[3] This paper is based on that document.

RESEARCH DESIGN

The study used survey research methods to obtain feedback from Langley engineers and scientists assigned to the Aeronautics, Electronics, Structures, and Space Directorates (internal population) and from engineers and scientists belonging to three professional societies (external population).

The sample of the internal population was developed from the 1,026 engineers and scientists assigned to the four research directorates. The sample of the external population was developed from the membership lists of three professional/technical societies that agreed to participate in the study. As a condition of participation, the anonymity of both the societies and their members was guaranteed. A listing of members in specialized categories of research was purchased from each society to match the four research areas of the Langley participants.

A random probability sample was drawn from each list in such a way that the research interests of the external sample reflected the research interests of the Langley sample on a percentage basis. Each person in the external sample was telephoned, and those who indicated that they were users of NASA technical reports were sent a questionnaire and a cover letter explaining the purpose of the survey. A typical Langley technical report was selected for each of the four areas of research, and each member of the external population received a copy of the sample report most closely related to his or her area of interest or research to decrease the likelihood of reconstructed logic.

The survey questionnaire contained 33 closed-ended questions and 3 open-ended questions. Each question was pretested for relevance and clarity. The closed-ended questions employed the attitude scaling technique developed by Fishbein and Ajzen.[4] The questions covered four topics: the NASA technical report format (the subject of this paper), the use of NASA scientific and technical information, the image of NASA and Langley-authored published information, and the use of NASA information products. The questionnaire was sent to 513 Langley engineers and scientists and 600 non-NASA engineers and scientists. The response rates were 74 and 85 percent, respectively.

STATISTICAL TREATMENT

Nominal scales were used to collect the reported data. The chi-square non-parametric statistic[5] was used to determine whether responses of the internal and external populations were statistically different.

DEMOGRAPHICS

Background data collected as part of the survey revealed that 75 percent of the internal and external respondents held positions as individual researchers, while 25 percent held technical management positions. Seventy-four percent of the internal respondents and 71 percent of the external respondents had at least 16 years of professional experience. Forty-one percent internally and 55 percent externally had been employed for 21 years or more.

RESULTS AND DISCUSSION

Summaries of the responses to eight of the survey questions are presented in Tables 1 through 8. The actual survey questions appear as table headings. The responses of both the internal (Langley) and external (non-NASA) engineers and scientists, as well as the combined responses, are presented for each question.

Desirability of a Table of Contents

In response to the question regarding the inclusion of a table of contents, a majority of both the internal and external respondents indicated that only long reports need a table of contents (Table 1). However, the internal and external response patterns were statistically different at the 95 percent confidence level. Significantly more external respondents (43.5 percent) than internal respondents (22.1 percent) indicated that all reports should contain a table of contents. The table of contents may be more useful to non-NASA readers than to Langley personnel because of less familiarity with the customary format.

Also relevant to this question is another survey question asking participants to list report components that could be deleted. In response to that question, 24 percent of the internal respondents, but only 10 percent of the external respondents, named the table of contents.

The survey also revealed that the table of contents ranks fifth in the order in which report components are read, and that it is read by 46 percent of all the respondents. The table of contents is used by 18 percent of the respondents in the screening process to determine whether to read a technical report.

TABLE 1

Question: Should ALL technical reports have a table of contents (regardless of length of report)?

Response	Percentage		
	Internal respondents n = 376	External respondents n = 503	Combined surveys n = 879
Yes, all should	22.1	43.5*	34.3
No, only long reports need it	77.9	56.5	65.7

*$p<0.05$. The response patterns of internal and external respondents are statistically different at the 95 percent confidence level.

Desirability of a Summary in Addition to an Abstract

A slight majority of internal respondents and a clear majority of the external respondents indicated the need for a summary in addition to the abstract in NASA technical reports (Table 2). Other survey results show that 81 percent of the internal respondents and 91 percent of the external respondents read the summary. More respondents in both groups read the summary than the abstract. In addition, the summary is the component used by the highest percentage of both internal and external readers in reviewing reports to determine whether to read the complete document. Finally, only 13 percent of the Langley engineers and scientists and only 7 percent of their external counterparts suggest deleting the summary from NASA technical reports.

The internal and external response patterns were statistically different at the 95 percent confidence level. Some of these differences may be due, at least in part, to the location of the abstract and summary in NASA reports. As required by NASA publication policy, the abstract appears on the last page of NASA reports, as part of the report documentation page. Some readers, particularly those who are not NASA employees, may be unaware of the existence of an abstract in NASA reports. The summary, on the other hand, is highly visible on the first page of a report. Nonetheless, all findings strongly indicate the need for a summary in addition to an abstract with the current NASA report format.

TABLE 2

Question: Given that NASA reports contain brief abstracts (about 200 words) in the back, do you also need the more detailed summary section (which appears in the front)?

Response	Percentage		
	Internal respondents n = 374	External respondents n = 496	Combined surveys n = 870
Yes, include a summary, too	51.1	68.7*	61.1
No, don't bother with it	48.9	31.3	38.9

*$p<0.05$. The response patterns of internal and external respondents are statistically different at the 95 percent confidence level.

Location of the Definition of Symbols and Glossary of Terms

A majority of both survey groups want the definition of symbols and the glossary of terms to be located near the front of the report rather than near the back or omitted (Table 3). Most respondents indicated that the symbols and terms need not be defined where they appear in the report if a definition of symbols and glossary of terms are present elsewhere in the report.

Other results of the survey show that 52 percent of the internal respondents and 56 percent of the external respondents do **not** read the symbols list and glossary. Considering this result alone, the need for these components might be questioned. However, only 6 percent of the survey groups (in response to another question) would suggest deleting the symbols list and glossary of terms. Thus, it appears that readers want these components to be included for reference.

TABLE 3

Question: Where in a NASA technical report should a definition of symbols and glossary of terms appear? (check only one)

Response	Percentage		
	Internal respondents n = 375	**External respondents n = 501**	**Combined surveys n = 876**
Near front of report	48.8	47.1†	47.9
Near back of report	12.3	15.0	13.8
Near front of report AND where symbol or term appears	20.5	16.2	18.0
Near back of report AND where symbol or term appears	8.3	9.2	8.8
NO symbol list or glossary of terms needed; just define symbol or term where it appears in report	10.1	12.6	11.5

† The response patterns of internal and external respondents are not statistically different at the 95 percent confidence level.

Location and Use of Illustrative Material

A clear majority of both survey groups indicated that illustrative material in NASA technical reports should be integrated with the text rather than grouped together at the end of the report (Table 4). A majority (80 percent) of those surveyed usually read the illustrative material with the text.

TABLE 4

Question: Where in a NASA technical report should the illustrative material (tables, graphs, photographs, etc) appear?

Response	Percentage		
	Internal respondents n = 375	**External respondents n = 500**	**Combined surveys n = 875**
Integrated with text	80.3	80.2†	80.2
Separate from text; at end of report	19.7	19.8	19.8

† The response patterns of internal and external respondents are not statistically different at the 95 percent confidence level.

The results of more detailed questioning of respondents who favor the integration of illustrative material confirm the need to incorporate tables and figures in the text (Table 5).

TABLE 5

Question: If illustrative material should be integrated, is there a point at which the illustrative material interrupts your reading? (check only one)

Response	Percentage		
	Internal respondents n = 298	**External respondents n = 399**	**Combined surveys n = 697**
Yes, when there are two pages of illustrative material for every page of text	25.5	19.3†	22.0
Yes, when there are three pages of illustrative material for every page of text	17.1	20.1	18.8
Yes, when there are four or more pages of illustrative material for every page of text	8.1	7.7	7.9
No, I always prefer to have illustrative material integrated in text	49.3	52.9	51.3

† The response patterns of internal and external respondents are not statistically different at the 95 percent confidence level.

Fifty-one percent of the combined groups prefer integration regardless of the amount of illustrative material in a report. However, when there are four or more pages of illustrative material per page of text, 49 percent of the users say that their reading would be interrupted by the volume of the visual material. Thus, the mandate to integrate illustrative material is somewhat tempered by a consideration of amount.

Format of Reference Citations

A clear majority of both internal and external respondents expressed a preference for references to be cited in the text by number (with a numbered list in the back of the report) rather than by author and year (Table 6). Nonetheless, more than a third prefer citations by author and year. The preference for the number method is surprising, since the author and year method provides the reader with instant reference identification, whereas the numbered system requires the reader to locate and refer to a list elsewhere in the report to obtain this same information.

TABLE 6

Question: Which of the following two forms of reference citation do you prefer for technical reports? (check one)

Response	Percentage		
	Internal respondents n = 371	**External respondents n = 494**	**Combined surveys n = 865**
Cited in text by author/year (e.g., Jones 1978) with an alphabetical list in back of report	35.8	36.0†	35.9
Cited in text by number (e.g., reference 16) with a numbered list in back of report	64.2	64.0	64.1

† The response patterns of internal and external respondents are not statistically different at the 95 percent confidence level.

Column Layout and Right Margin Treatment

Over half of the internal and external respondents prefer the one-column, ragged-margin format (Table 7). The one-column, justified-right-margin layout is preferred by the second largest portion of both survey groups. The one-column format is preferred by 79 percent of those surveyed. Ragged-right-margins are preferred over justified right margins by 61.5 percent of the respondents.

TABLE 7

Question: Which of the following forms of layout do you prefer for technical reports? (check only one)

Response	Percentage		
	Internal respondents n = 365	**External respondents n = 483**	**Combined surveys n = 848**
One column; ragged right margin	53.4	55.3†	54.5
One column; justified right margin	24.9	24.4	24.6
Two columns; ragged right margin	8.8	5.6	7.0
Two columns; justified right margin	12.9	14.7	13.9

† The response patten. of internal and external respondents are not statistically different at the 95 percent confidence level.

Person and Voice

Among both groups, the passive-voice, third-person option was chosen most often as the preferred writing style for technical reports (Table 8). Among the internal population, this preference represents a slight majority (53 percent); among the external population, it is 45 percent. The internal and external response patterns were statistically different at the 95 percent confidence level.

TABLE 8

Question: Which of the following writing styles do you prefer for technical reports? (check only one)

Response	Percentage		
	Internal respondents n = 368	External respondents n = 487	Combined surveys n = 855
Passive voice, third person	53.0	45.0*	48.4
Active voice, third person	20.4	19.1	19.7
Active voice, first person	26.6	35.9	31.9

*$p<0.05$. The response patterns of internal and external respondents are statistically different at the 95 percent confidence level.

Considering voice alone, Langley engineers and scientists prefer passive over active voice by a 53/47 ratio. External engineers and scientists, on the other hand, prefer active over passive by a 55/45 ratio.

The majority of both the internal (73 percent) and external (64 percent) respondents prefer that third person be used rather than first person in NASA technical reports.

CONCLUDING REMARKS

The survey reported in this paper was concerned only with the NASA technical report format, but the findings may also be applicable for other technical reports that record significant scientific and technical accomplishments and that are prepared for external distribution. The preferences expressed by the internal and external respondents were fairly similar with the two groups having statistically significant differences on only three of eight survey questions on format and layout. In retrospect, there was little reason to expect any significant differences between the two groups for most questions. There was perhaps some reason to anticipate differences on the questions concerning the table of contents and the abstract because of the different levels of familiarity with the NASA technical report format the two groups might be expected to possess. The internal respondents would be expected to have a high degree of familiarity with the format and, therefore, have little need for a table of contents. External respondents might be expected to be less aware of the location and position of the abstract on the last page in the report. Thus, external respondents might feel a greater need for a summary near the front of the report because the summary might be viewed as the only synthesis of the report. There was little reason to expect a significant difference in writing style preference. However, the observed difference could be attributed to different style requirements of NASA technical reports and journal articles. Specifically, NASA technical reports tend to be written in the passive voice, third person, while journal articles generally tend to be written in the active voice, first person. The difference in preference could thus be attributed to prior experience and expectations.

The data offer useful insights into what engineers and scientists prefer to see in the organization, format, layout, and language of NASA technical reports. These data may also provide an added dimension and new perspective to the textbook, journal, and style manual guidelines for authors and editors of scientific and technical publications in general and technical reports in particular. Editors and document designers may wish to consider these reader preferences when setting policies and making decisions about their technical reports.

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Special Problems in Technical Communication Education

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These three papers discuss trends and needs in the technical communications education program. They share, as well, the awareness that the student who will become a technical writer must understand the tradition of the discipline so that he or she can write effectively about issues and problems which may be revolutionary in their impact because of their scientific or technical nature.

Dr. Allen's "The Literature of Science and the Technical Communication Curriculum" discusses works by Charles Darwin, Lewis Thomas, Thomas Kuhn, and others as examples of publications that introduced new concepts to the public. The concepts are foundations of scientific thought, and technical writers can use them as they prepare manuscripts about new ideas. These authors also assist writers who may think about science as a revolutionary process. The writers Dr. Allen discusses understood the importance of writing about their studies and results. They realized that their work would have social impact only if it were communicated both to their peers and to the non-scientific public; thus these writers provide today's students with insight into writing as part of the philosophy and process of science.

Ms. Porter's "Teaching Linguistics to Technical Communication Students" discusses linguistics as a tradition which the technical communications student can study as a source for stylistic decisions. Her thesis is that linguistics can enhance a student's ability to select words, styles, and mechanisms for delivering a useful product and for resolving language conflicts in product description. The article discusses the use of linguistics in the creation of effective manuals, proposals, instructions, and descriptions as well as in other practical documents. Ms. Porter poses several questions that a technical writer might ask about the linguistics of a document during the planning process. Her essay suggests that better products could be presented if linguistic considerations could be addressed in the planning stages.

Dr. Philbin's article, "A Necessary Language of the Future: Statistics for the Technical Writing Student," draws as well upon tradition. The article talks about "data-based" writing as the use of computers causes increased reporting of events as lists of numbers. The article discusses certain components of the traditional statistics curriculum which can be extracted and taught to technical writing students in about twenty to thirty hours. This list forms the core of a program of statistical literacy for the student who will be required to write about collections of data in the future.

In summary, all three papers treat the theme of educating the writer for responsibility in communicating scientific and technical concepts accurately. This mission falls to the technical writer whether or not he or she is a scientist. It is the writer who can move the ideas and results from the laboratory to the public imagination. The technical writing profession must make certain that the student learns to do so accurately.

The Literature of Science and the Technical Writing Curriculum

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The value of studying the literature of science is discussed from time to time by teachers of technical writing. This presentation reiterates the importance of studying the literature of science, suggesting that studying the literature of science can help students appreciate the integral role of writing in the history of science. It recommends the work of Lewis Thomas and Thomas Kuhn to reinforce the significance of writing as an instrument of science.

The value of studying the literature of science is discussed from time to time by teachers of technical writing. In "What Can the Technical Writer of the Past Teach the Technical Writer of Today," Walter James Miller traces "the main line of descent of the modern American technical writer through twelve representative writers from Vitruvius and Frontinus through Hoover, Ammann, and Raymond (1). Miller illustrates a discussion of literary techniques, including the use of metaphor, analogy, definition, description, and inductive and deductive approaches, with quotations designed to help his readers appreciate the classics of science. Roger E. Masse and Patrick M. Kelley, in "Teaching the Tradition of Technical and Scientific Writing," tell how they use a class period in an introductory technical writing course to introduce students to the "tradition of technical and scientific writing" (2). In "From Aristotle to Einstein: Scientific Literature and the Teaching of Writing," Stephen Gresham suggests how scientific literature can be used in the technical writing classroom to demonstrate that "technical writing is a discipline with a history and a solid tradition," to provide models for the study and use of the rhetorical modes, to demonstrate the clarity and audience-orientation of good scientific writing, to introduce students to Frederich Houk Law's concept of the "poetry of science," and to give students a better awareness of their own technical disciplines (3).

This presentation reiterates the importance of studying the literature of science and suggests that by sounding the literature of the past we may enhance the future of scientists and of technical communicators. A survey course in the literature of science can educate science and nonscience students to the tradition of scientific literature. By bringing students to appreciate the tradition of scientific literature and by introducing them to the ideas of scientists such as Lewis Thomas and Thomas Kuhn, men whose insight into their disciplines illuminates the significance of writing and communication throughout the history of science, we can help them to see that writing is integral to science and technology.

A survey course in the literature of science is of interest to students in a broad range of scientific and technical disciplines because the subject matter is relevant to their primary interests and adds a historical perspective to the work that is being done in their disciplines.

Nonscience majors likewise are interested in the content of courses in the literature of science. Many technical communication students have little knowledge of scientific tradition. They may be aware of the significance of Darwin's Origin of Species and Lyell's Principles of Geology because they have studied English literature and the impact of science on nineteenth century poetry and fiction. But few of them have any real sense of the history of science. A survey course in the literature of science can educate them in the tradition of science and make them more receptive to, more interested in, current science and technology. A survey course in the literature of science can help them to overcome the handicap that Thomas Henry Huxley spoke of in 1880 when he criticized the "purely classical education":

> An army without weapons of precision and with no particular base of operations, might more hopefully enter upon a campaign on the Rhine than a man, devoid of a knowledge of what physical science has done in the last century, upon a criticism of life. (4)

Huxley's admonition is even more relevant today than it was a hundred years ago. Students need to be aware of scientific tradition; they need to have some understanding of the history of the technology that has thrust human beings into the Information Age. A survey course in the literature of science can provide that background.

Moreover, a survey course that interests students offers us, as teachers, the opportunity to emphasize the integral role of writing in the history of science. As others have noted, the literature of science offers numerous models representing the array of rhetorical devices that students need to be able to recognize as analytical readers and to use as effective communicators. But we can fortify a chronological and rhetorical approach to the literature of science with an introduction to the ideas of such scientists as Lewis Thomas and Thomas Kuhn, whose insight illuminates the integral nature of writing and science.

Lewis Thomas' The Lives of a Cell: Notes of a Biology Watcher can be helpful in establishing a theme for a survey course designed to emphasize the importance of writing to science (5). In The Lives of Cell, a collection of 30 short essays, Thomas uses the metaphor of the cell to illustrate the interdependence of all life. He emphasizes the ties between science and its literature in the piece "On Societies as Organisms." In this essay he compares "the aggregating clusters of medical scientists swarmed" for an annual meeting to an assemblage of social insects:

> There is the same vibrating, ionic movement, interrupted by the darting back and forth of jerky individuals to touch antennae and exchange small bits of information; periodically, the mass casts out, like a trout line, a long single file unerringly toward Child's. If the boards were not fastened down, it would not be a surprise to see them put together a nest of sorts. (p. 11)

Thomas goes on to compare humans to ants, termites, and other social insects. Ants, he says, function as solitary individuals and in groups as a "whole beast . . . thinking, planning, calculating." Termites likewise "accumulate intelligence as they gather together" (pp. 12-13). And bees "live lives of organisms, tissues, cells, organelles." Likewise, humans seem to be "linked in circuits for the storage, processing, and retrieval of information, since this appears to be the most basic and universal of all human enterprises. It may be our biological function to build a certain kind of Hill" (p. 14). In concluding his essay, Thomas emphasizes the tie that exists between writing and literature and science:

> We like to think of exploring in science as a lonely, meditative business, and so it is in the first stages, but always, sooner or later, before the enterprise reaches completion, as we explore, we call to each other, communicate, publish, send letters to the editors, present papers, cry out on finding. (p. 15)

The importance of information transfer to science is implicit in Thomas Kuhn's The Structure of Scientific Revolutions (6). Kuhn emphasizes the role of the paradigm as an organizing force throughout the history of science. Paradigms are "universally recognized scientific achievements that for a time provide model problems and solutions to a community of practitioners" (p. viii). The classics of science and the textbooks and other writings that make up scientific literature from the nineteenth century onward have formulated the paradigms that organized the scientific community so that scientists share commitments to the "same rules and standards for scientific practice." Such commitment and consensus are prerequisites for "the genesis and continuation of a particular research tradition" (p. 11).

The paradigm, as an organizing factor, helps to transform a group into a discipline and permits a scientist to begin research where the paradigm leaves off. The paradigm also enforces restrictions on a science, restrictions that require a detailed, in-depth investigation of nature as scientists work to add to the scope and precision with which a paradigm can be applied.

Yet as Kuhn emphasizes, a paradigm is not static. Research repeatedly uncovers anomalies that cannot be reconciled within a paradigm, and the result is often the articulation of a new paradigm that contends with the old paradigm. Resolution of the conflict results in the replacement of the old paradigm with the new, a replacement that typically results in a shift in world view for those scientists who embrace the new paradigm.

Perhaps the most well-known instance of such a resolution occurred with the Copernican Revolution, which required an almost total shift in perspective, a shift from a geocentric to a heliocentric perspective. Such shifts in vision occur whenever a new paradigm replaces an old paradigm, and although they are seldom as all-encompassing as the shift that accompanied the Copernican Revolution, they are traumatic for the scientists who must come to accept them in order to continue their work as scientists.

In this period of conversion from one paradigm to another, the role of language and rhetoric takes on added significance, for the competition between rival paradigms requires the persuasion of a community of scientists, and sometimes the lay public, that the new paradigm can indeed solve problems not solved by the old paradigm.

Whenever one paradigm contends with another, communication breaks down. The new paradigm, while it may ostensibly use the language of the old, involves new combinations and relationships that are incompatible with concepts held by those who continue to adhere to the old paradigm.

The solution, according to Kuhn, is for the participants in the communication breakdown to "recognize each other as members of different language communities" and to translate for one another. By isolating areas of difficulty in communication and trying to "discover what the other would see and say when presented with a stimulus to which his own verbal response would be different," the participant can "translate the other's theory and its consequences into his own language and simultaneously . . . describe in his language the world to which that theory applies" (p. 202).

Such translation Kuhn prescribes as a tool for use in persuasion. Kuhn's concept of the paradigm as an organizing force for science and his emphasis on the importance of language in communicating a shift in paradigm can help students understand the rhetorical problems of scientists as they go about their work of inculcating revolutionary ideas in the minds of an audience resistant to change. By introducing students to the ideas of Lewis Thomas and Thomas Kuhn as they study the tradition of scientific writing, we can help them to see that writing is indeed integral to science, that through writing scientists further and fulfill their information-gathering function.

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Teaching Linguistics to Technical Communication Students

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Technical communication students should become aware of linguistics if they are to work more effectively with words. Instructors can easily supplement the course content for the traditional technical writing and editing courses by adding information about the variations in grammars used in the United States, word origin and development, variety in sentence structure and word combinations, and appropriate style and tone. Sociolinguistic concerns can be added to the audience analysis lesson, when instructors discuss sexism in language, specific vocabularies for occupations and workers with specialized linguistic backgrounds, and effective communication for various audiences. If students become more aware of language and its possibilities, they can more effectively communicate with many audiences needing varying levels of technical and scientific information.

An overview of descriptions of required courses for technical communication students shows that linguistics is virtually ignored as a formal part of these students' professional preparation. Linguistics courses are usually reserved for the traditional English majors, who, it is assumed, need to understand the nature and structure of language. In addition, linguistics is more commonly the study of spoken language and only peripherally with written expression. Therefore, the assumption is that technical communicators work more with written than spoken communication and do not need to understand the form and function of language, as studied in linguistics.

This view contradicts the essence of technical communication. At its best, technical communication uses language precisely to convey complex or structured ideas in readily understandable terms. Words, both written and spoken, are the tools of the technical communicator's craft. Formal instruction in linguistics, in addition to the standard technical writing and editing courses, can provide students a greater understanding of language and its possibilities. By developing knowledge of the foundation of language, technical communication students can better use words in their work.

Technical communication courses usually give students experience in writing manuals, proposals, instructions, descriptions, and other practical documents they will work with in business and industry. Editing, technology, graphics, and computer courses also prepare students for jobs in technical communication. Instructors seem to assume that students already grasp the fundamentals of language without formal study of linguistics. Although students intuitively speak and write their language, they should understand the grammar of standard English. A deeper understanding of the origins of language and study of the infinite combinations of word patterns can give students more experience with language and a broader repertoire of stylistic choices on which to base their writing.

To understand better the significance linguistics has for technical communicators, some of the characteristics of linguistics must be described. Linguistics is the study of language, but linguists stress spoken rather than written communication. Grammar, or the rules of language and the variations in word combinations based on these rules, is one area of linguistic study. However, these rules can change among different groups of people in various situations. Sociolinguists are more concerned with the dialects and grammars within a society than with structures of linguistic components; these linguists thus study social relationships and language to understand the linguistic choices which allow individuals to adapt to different situations. For example, most people have different vocabularies, sentence structures, and communication styles at home, work, a formal gathering, a business meeting, a football game, or a religious ceremony. Some sociolinguists study language associated with occupational roles. Highly specialized work or jobs involving new technology often have their own vocabularies and jargon. These variations from the standard English dialect taught in schools should be understood if technical communicators want to communicate effectively with their audiences.

Technical communicators work with verbal communication. Training programs particularly need an instructor's lecture or pre-recorded videotape, sound/slide program, or other form of oral communication to supplement written documents. Technical communication involves interviewing, questioning, analyzing, and explaining technical ideas. It conveys these ideas through speeches and audiovisual presentations for professional meetings, marketing promotions, and training seminars. If linguists assume they alone need to understand and appreciate word combinations, they do not fully understand the dimensions of language within technical communication.

To teach technical communication students about linguistics, instructors should first teach students that standard English grammar is only one of the grammars found in the United States. However, because it is the "accepted" grammar for formal papers, manuals, and instructions, students should understand the structure and function of standard English. Publications for technical communicators, including instructors, often have a grammar section that analyzes or illustrates a problem with language. These monthly or quarterly columns are written to guide professional communicators to a more precise, acceptable way of speaking and writing. If grammar and the nuances of language are crucial to professionals, students who are just beginning their professional preparation should also become aware of the peculiarities and variations of the standard dialect they will use most often in their work.

The guidelines presented in professional publications also indicate the richness of language. Students should not be taught that technical information is always presented through short sentences made up of a subject and a verb or of the imperative voice. There are several ways to phrase an idea so that it can be clearly understood. Students need more practice in rewriting and revising their documents and in experimenting with their word choices and different ways to present material.

Attention to the audience is particularly important to the sociolinguistic aspects of technical communication. Most technical communication textbooks devote at least a few pages to audience analysis. Instructors teach students to consider the characteristics of the target audience for a document or oral presentation. Some of these characteristics include the age, sex, occupation, cultural background, and educational background of the audience. Although sociolinguistics is never mentioned, its importance is implied. Technical communicators need to present ideas and practical information to audiences with diverse linguistic backgrounds. To communicate effectively, technical communicators should at least understand there are variations of standard English. Although some documents and programs require technical communication for a homogeneous group, students should be aware of the diversity of language patterns and consider these differences before devising an effective way to disseminate information to the audience.

Although linguistics can be implemented in the classroom to study writing style, grammar, and rewriting and editing for variety in language, perhaps the most direct way linguistics can supplement the technical communication curriculum is through the audience analysis lesson. The lesson acquaints students with several audiences and assesses each audience's particular needs and characteristics. To analyze an audience, students must anticipate any dialects or variations of standard English that may influence their audience's understanding of technical material. Students must also plan word, sentence, and paragraph length and structure to meet the audience's level of understanding and the situation in which the information will be used. Linguistic concerns include standardization of terms, elimination of sexist language, clarity of expression, and education and interest levels among users of the information. These linguistically-based considerations are then combined with technical concerns. Students can next answer a series of applicable questions, such as the following:

1. How should I structure sentences for easy reference in a printed document, or how should I organize language in an oral presentation?
2. How can I maintain interest through a variety of sentence structures that still ensure uniformity of style throughout the document?
3. How can I consider the language differences from standard English without compromising the document or program as a standard reference or for use in national distribution?
4. What tone should I use?
5. Do audiences know the definitions of the new technological or scientific terms I need to use?

These questions for audience analysis can then lead to a discussion of the sociolinguistic considerations for technical communication. If students have already worked with grammars and discussed the variety of language patterns within those rules, they should be able to think of ways to effectively communicate with diverse audiences.

Students can then use this background in the sociolinguistic aspects of technical communication to deal with more precise word development. For example, new technological terms are coined, blended from other words, or used in new contexts. "Splashdown" was once a new blend of two old words. Computer terms are often used in contexts other than computer information; "interface" and "feedback" are two of the more common terms used conversationally to refer to ideas other than those dealing with computers. When students understand the ways language can be used to communicate with diverse audiences, they can pay attention to the development of words in the language.

Technical communication students should be made more aware of the elements of the language they use. Technical communication courses should include brief studies of grammar, sentence revision, word origins and development, and the sociolinguistic concerns of audience analysis. These areas can easily be worked into the coursework. If students are forced to examine and consider carefully their linguistic choices which they too often take for granted, they can work more effectively with the basis of technical communication--words.

A Necessary Language of the Future: Statistics for the Technical Writing Student

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Graduates of technical writing programs have indicated that they use statistical data regularly as they perform on the job. This article discusses the problems created by the need for statistical competence among technical writers. An operational definition of a grammar of statistics is proposed. The author outlines the components of a basic grammar and vocabulary of statistics for technical writing students. The grammar is described by correct format, best illustrations, and appropriate logic. The vocabulary is defined by basic terms, illustrations, and ubiquitous language. Course content is presented and the continued need for statistics training in the technical communications class is discussed.

Each spring, I conduct telephone interviews with graduates of the technical writing programs in which I have taught to hear their comments about the changes occurring in the profession and the recommendations they would like to make for the implementation of new training in existing programs. This past spring, I asked my students how they expected the computer to influence their success as technical writers, and 40% of my graduates said that they use statistics with increasing regularity on the job and that they wished they had obtained more training in the interpretation of statistics as a technical writing tool. I asked the students to send me written descriptions of the statistics they use on the job, and from their responses I composed a list of statistics that technical writers will need to know in the future. But first, I would like to discuss why statistics will be important.

My students told me that the computer is responsible for their increased use of statistics. Graduates of the aviation program stated that as airport managers they now have to use business programs that provide statistical output as the basis for the reports they write. The health care graduates pointed out that more and more medical data are collected and presented to the specialist through statistical packages for the medical sciences. In both cases, graduates told me that they do not have to know how to compute scores because the computer performs this function, but they do have to comprehend a score, and they have to be able to explain and interpret scores in writing so that the data can be understood by lay audiences. The distinction between comprehension of equations and interpretation is important because we, as technical writing teachers, cannot possibly become statistics teachers, but we can develop and instruct students in a proper grammar and in a vocabulary of understanding of statistics for the technical writer.

I propose that we define, test, and improve a basic grammar for statistics and a vocabulary for writing about statistics that technical writing students and majors can study as they proceed through their training and can use when they write on the job.

This concept is not new in teaching although it might be new as a method of introducing the lay writer to statistics. For instance, at the School of Technical Careers, Southern Illinois University, we have been teaching students the grammars and vocabularies of their professions for some time. We have designed and written package programs for the microcomputers in our lab that train a student in the vocabulary of legal assistance, medical and dental care, aviation and avionics, and records management. The distinctive feature of these programs is that they teach the student to write about aviation maintenance--not necessarily how to fix the airplane or how to rewrite a postoperative report--not how to do the surgery. The students learn the needed facts and terms of their career grammars and vocabularies primarily through repetition of key ideas and rote memory of necessary vocabulary. For example, in twenty to thirty hours, a student can learn everything he or she will need to know to become a medical technician who can write and speak effectively about terms and concepts in a chosen allied health specialty. The same can be done with statistics for the technical writer who must write about data or concepts presented using data bases--even though some statisticians might think this concept is heresy.

A grammar of statistics for the technical writer would be defined by the writer's ability to present data by using the most correct format, the best illustration, and the most appropriate logical structure for the context. These matters are not necessarily "judgment calls;" rather, the grammar of statistics is determined by the truth to fact which scientific writing necessitates.

CORRECT FORMAT

The student should learn to present data using the correct format. This means that he or she knows not only what to include, but also, what to omit. For example, if the writer is presenting a set of correlations, he or she must remember not to drop the probability statements because "they won't fit," or because a line of space can be saved. In stating correlations, probabilities and population sizes must be included for any reasonable interpretation. Further, the type of correlation, Pearson or point bi-serial, etc., must be presented. Linear f ratios should be presented with their degrees of freedom. A tabular format should be used and the means should appear with their R ratios stated in terms of full and restricted models. This is not a matter the writer gets to decide; like correct English grammar, the grammar of statistics requires a standard format. Correlations are a favorite example of mine because so often they are misrepresented as causal analysis, but we can list other examples of correct format. For instance, the writer must use the correct format for presenting data on a matrix, for listing means with their standard deviations, and for defining degrees of freedom. Any basic statistics text will explain the grammar of statistics but the teacher is referred to package programs such as SPSS, SAS, BIOMED, or any general linear package for examples of the required formats.

BEST ILLUSTRATION

The student needs to learn when to use a table and when to use a graph. A frequency polygon cannot be substituted for a linear table in presenting data because the two forms represent different mathematical functions. A linear table should present all the data collected for a given number, but a frequency polygon is itself a representation of a mathematical equation. Thus, the space under the polygon on a frequency polygon represents exact measures on the x and y axes of a grid. It is the picture of a relationship, so it must reflect that fact accurately. The two dimensions must be clear and the intervals must be defined clearly for an audience's understanding. A histogram represents a different mathematical reality. It should not be substituted for a frequency polygon. A basic pie graph, on the other hand, represents a set of percentages that must equal 100%. The student cannot take data from a linear table and try to represent such information in a "summary" or a simplified illustration such as a pie graph. Finite numbers, exact measures, should not be translated into percentages; the two types of data are different and standard formats must be used for each type of data. Because of the information proliferation and some degree of math ignorance among writers and illustrators, edited data are frequently misrepresented in illustrations. We would never let a student abbreviate inconsistently; we make sure that the student learns the correct postal Zip Code abbreviations. Do we also make that student learn the standard mathematical illustrations that duplicate equations?

APPROPRIATE LOGIC

Logic dictates that the writer can adhere to an appropriate narrative for the information to be presented. Facts must be labeled as such, theorems must be cited, and descriptions must be factual, not causal, unless a cause can be proven. For example, a medical writer may be handed data that state a correlation (r) equals .90 between AIDS and male homosexuals. (This is a good example because we read it in the press regularly.) This equation does not mean that homosexuality causes AIDS. An r = .90 means that 81% of the time AIDS and homosexuals can be related mathematically; that is, they go together in the population described 81% of the time. If the researcher then wants to study why that correlation occurs, or if the researcher then wants to imply that the correlation results from other data, he or she is within the laws of logic. As an extended example of logic in a statistical narrative, we have to teach the student that a correlation is a descriptive not a causal statistic. The statistics our students use, which are basically descriptive, not inferential, allow for effective summaries of large masses of data such as calculation of averages from large collections of data for ease of oral and written communication. While these data can be used for the rhetorical techniques of definition and description by exemplification, they cannot logically be used for a rhetoric of causal analysis. For causal analysis, the writer must treat sample populations in controlled conditions using the scientific method to imply causality.

BASIC VOCABULARY

A basic vocabulary is much easier to define than a basic grammar because the vocabulary of statistics remains the same no matter what procedure is employed. In a basic vocabulary, the student needs to know how to write basic terms that will appear in equations, how to combine equations, illustrations, and text, and how to choose appropriate, that is, ubiquitous language.

Basic terms. There are about forty basic terms that a student will learn in a standard introduction to statistics on a semester basis. The technical writer is referred to any standard text for a complete list. For non-statistical, technical writing students, I have created a condensed list. A writer may want to memorize this list or keep a "cheat" sheet handy. The terms are straightforward, but they can quickly become complicated if the terms need to be set in type. In my class, students receive practice in ordering "Greek letters" so that they can understand how difficult it is to get the printer to prepare "foreign" letters, and how carefully satistical statements must be edited.

Figure 1

Short List of Statistical Symbols

r	correlation
R	linear variance
X	grand mean
f	frequency
F	F-ratio
s	standard deviation
Σ	sum
ΣX	sum of scores
H_0	the null hypothesis
H_1	the alternate hypothesis
i	interval size
N	number of scores
X	sample mean
σ	population standard deviation
p	probability
$(\Sigma X)^2$	square of the sum
z	standard score
$\Sigma(X-X)^2$	sum of squares

Illustrations. Students need more practice in the design of tables and graphs. They need to learn where to place a table on the page so that a complete set of facts can be scanned by the reader as he or she reads the data of results and discussion in the text. Although this task seems relatively easy, my students tell me that they have difficulty determining which elements to leave in a table, and which elements of data to extract for discussion. Now I provide my students with individual editing projects; they take tables of results that I collected in my journal editing days, and they write up the results, design tables, place the tables in text for brief discussion or place the tables in an appendix for extended reading. When they get on the job, the students report that they use this practice very often in their business and scientific writing.

New word processing packages provide increasing control of table and graph formats; perhaps in a few years, we will not have to teach students how to "make" tables. In the meantime, the student needs to know the logical sense of a table and needs to know how to extract the significant data for discussion without becoming repetitious. I know of no other way to teach this technique than by the good, old fashioned rewrite. I also have my students practice writing equations that run on in text as well as equations that must be set separately and dropped in. In time, this practice, too, will become obsolete but chances are that a student will take a first job in a small, informal, technical writing group where he or she will have to exert some control over production of documents.

Ubiquitous language. In my theory of statistical writing, I differentiate between terms and language. Terms refer to symbols primarily, whereas language refers to definitions of terminology students need to understand. I am not satisfied with my names for categories yet, and I welcome suggestions. There are certain terms whose meanings are constant in writing about data.

Figure 2

Short List of Standard Terms

1. Number Knowledge--nominal, ordinal, interval, ratio
2. Basic Concepts--mean, median, mode, range, standard deviation, number line, quartile, decile, stanine, standard deviation, special terms related to student's major
3. Comparative Numbers--(two number lines) correlation, chi square, regression, F-ratio, ANOVA, Student's t
4. Standard Scores--Weschler, IQ, CEEB, ACT, T score, z score, military scores

In composing my short and long lists of standard terms, I have drawn liberally from various statistics textbooks and the materials published by the Society for Technical Communications. No doubt, more terms will be added this year as I teach English majors who, I suspect, will differ from technical students in their backgrounds. I find it useful to make a list of standard terms like the one in Figure 2 because such a list can be distributed to the students so they can know exactly which terms you expect them to know. Usually the students come in with new terms in relation to their majors, and this is how item two on the list is altered from semester to semester. I think the items in this list are self-explanatory. What the list does, is give the student a set of operational definitions to use in approaching data. Rather than being overpowered by a collection of data, the student can take a list like this one and approach a given scientific or technical article as a set or particular type of number collection within the universe that is composed of all the numeric writing that can be imagined.

One need only consider Three Mile Island and some of the other technical debacles that have occurred recently to realize that even when a technical writer has a quite sophisticated background in technology or science, the technician as writer needs at least a basic knowledge of statistics in order to describe his or her work situation with any degree of accuracy. Computers record numbers and letters, and they can even be programmed to interpret data using mathematics but they are best at the simple presentation and procesing of huge banks of data. With such data collection now possible, the technician enters a new future in which he or she must act as the interpreter of mathematically condensed events and information in science and technology. The responsibility is awesome and somewhat terrifying. Unless our students learn a rhetoric of basic statistics and operational definitions of types and numbers, they will be handicapped in tomorrow's world which will be their professional universe.

Degree Programs in Technical Communication: The Students' Viewpoint

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As the professional status of technical communication grows, so must the attention focused on the academic programs that prepare new technical writers and editors. Because technical communication is a relatively new career, because it has not yet benefited from decades of training, and because it does not license its practitioners, technical communication organizations such as STC must help ensure quality in the field by examining closely the philosophy, the methods, and the results of degree programs in technical communication.

Of course, the preparation of technical writers and editors is not a new issue for STC. How best to prepare for a career in technical communication has been a subject of debate within the Society for years. Rarely, however, has that debate included the students themselves, those who are actually preparing for a technical communication career. What are their opinions of the preparation process? What do they think about existing degree programs in technical communication?

As a forum for student opinion, this panel gives professionals and professors alike an opportunity to hear future technical communicators discuss their career preparation. The panel focuses on degree programs in a broad sense and not on specific details about existing programs, since program descriptions are readily available elsewhere, notably in the Society's 1981 publication Academic Programs in Technical Communication. The discussion focuses on three broad areas: the curriculum, the philosophy, and the role of degree programs in technical communication. The following questions are considered.

- What do students expect from undergraduate and graduate degree programs in technical communication?
- What elements are essential to a degree program?
- Does having a technical communication degree imply having a certain body of knowledge? If so, what is it?
- Do existing degree programs provide that knowledge?
- Should all degree programs in technical communication offer a similar core curriculum?
- Which should receive the most emphasis in degree programs, technical or language skills?
- Which should receive the most emphasis, theory or practice?
- What is the best way to gain practical knowledge in the course of a degree program?
- What should be the role of degree programs in technical communication? Should the programs prepare students for a profession or merely provide them with a set of marketable skills?
- Does having a degree in technical communication matter in the marketplace? If it does not matter now, will it matter in the future?
- Is having a graduate degree in technical communication important?

Technically Speaking: Teaching Oral Technical Presentation

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Increasing need for oral presentation by scientists, engineers, and technologists has moved authors to include chapters on speech in virtually every new technical writing text. Yet these needed assignments are often ignored. The purpose of this workshop is to share experience of those who are teaching oral presentation with those who have yet to try it. Brief discussion, brainstorming, and simulation of classroom speech session, with handouts for future use.

Teaching Oral Technical Presentation in a technical writing class adds yet another task to an already crowded curriculum. Hence, teachers are understandably reluctant to make any additions. Typically, they raise questions like these:

I. DO OUR STUDENTS REALLY NEED TRAINING IN ORAL PRESENTATION?

Surveys of tasks performed by scientists, engineers, and technologists; recommendations from engineering societies; and proliferation of videotapes and teleconferences support the view that the need for training in this area is critical.

II. WHAT HAS BEEN THE RESPONSE TO THIS NEED?

Authors have provided background material and many speaking assignments in virtually every new textbook. And many technical writing teachers have added oral presentation, with varying degrees of success. We will exchange information on experiences with speech assignments, and consider ways to accommodate new assignments without sacrificing the older ones.

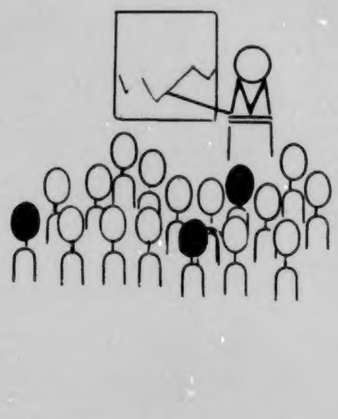
III. WHAT ABOUT QUESTIONS THE TEXTBOOKS DON'T ANSWER?

The texts are designed for students, and many manuals blithely ignore teachers' inexperience in questions concerning time constraints, policy on using notes, whether to require visual aids, what weight the assignment deserves, who should do the evaluation, etc. Discussion of current practice in full-time oral presentation classes will provide answers for such questions.

IV. ARE THERE WAYS TO "EASE INTO" ORAL PRESENTATION FOR BOTH TEACHERS AND STUDENTS?

Yes, there are. It is important to recognize that students can't spring from silence to stardom as speakers overnight. However, a high standard of performance can be achieved by stepwise progress from low-risk tasks to the final stand-alone presentation at term's end. Suggestions will be offered to give teacher and students a "positive experience" with the rudiments of oral presentation.

Finally, a simulation of a classroom speech session will be provided, so that workshop participants can have "hands-on" experience in criticism and evaluation of oral presentations.



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Although editing is a transferable skill - i.e., the principles of good editing are independent of subject matter - technical writing poses special problems. To the novice, it looks like so much gibberish - clumps of strange-looking words strung together with no apparent regard for logic, order or clarity. But appearances are deceiving. Technical writing is built of the same bricks as the most elegant prose -- nouns, verbs, adjectives, adverbs -- cemented together in the same syntactical structure that governs all English composition. To further simplify things, most engineer- and scientist-authors adopt the same prefabricated style and make the same mistakes, which students can learn to recognize and correct.

The purpose of this workshop is to demonstrate techiques for teaching students how to identify the commonest problems in technical writing, and how to analyze and edit difficult technical material. Workshop participants will get hands-on experience with beginning, intermediate and advanced editing practice exercises.

The editing workshop will be useful for anyone who trains editors, teaches editing, or supervises an editorial staff. Editors and writers interested in learning more about the editorial process will also benefit.

Sampling of Workshop Topics

- Problems in Technical Writing
- Quick Fixes
  - -Deleting Superfluous Words
  - -Simplifying
  - -Verb Liberation
- Analytical Editing
  - "Telegramming"
  - Purging Prepositions
- Editing for Style and Clarity
- Editing for Tone and Emphasis
- Developing Sensitivity to Words
- Editing Tables and Figures
- Editing a Set of Instructions

and others

Developing Student Internships and Cooperative Education Programs in Technical Communication

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ABSTRACT

In this session, three different programs for creating opportunities for students to gain work experience were presented. Bruno Petrauskas discussed how the Rochester Chapter STC played a major role in developing a cooperative program that combines the traditional cooperative education experience with the conventional student internship experience. Sherry Southard described how Oklahoma State University gives students an opportunity for work experience in a lean economy by using a projects-approach internship. Sherry Little and Margaret Cathcart described developing student internships at San Diego State University as the culminating experience within the Scientific and Technical Writing Certificate Program.

STUDENT INTERNSHIPS AND COOPERATIVE EDUCATION PROGRAMS

The participants in this session were Bruno Petrauskas, Technical Writer, Scientific Calculations, Inc., and President, Rochester Chapter STC; Dr. Sherry Southard, Assistant Professor of Technical Writing, Oklahoma State University; Margaret Cathcart, Head, Publications Division, Naval Ocean Systems Center; and Dr. Sherry Little, Director, Technical Writing Program, San Diego State University, who acted as moderator.

The session reported on ways students achieve work experience in internship experiences, allowing them to apply their classroom skills in actual work settings. The many advantages of such experiences to students, employers, and schools were discussed. The different programs from across the United States showed the various ways such programs can be designed and developed for those interested in creating opportunities for students to gain work experience.

Bruno Petrauskas presented how the Rochester Chapter of STC played an instrumental part in the design of a technical communication co-op program. This program combines characteristics of the traditional cooperative education experience with the conventional student internship experience, with students receiving pay and school credit. The active participation of the Rochester Chapter STC in designing and advertising the program and the precedures that the Chapter, interested employers, and college representatives followed to create a program packet were presented. The program packet contains all the materials needed to start and operate the program: Program description, Program guidelines, Program forms (Job description form, Learning contract, and Evaluation form), Letters (to STC members and to prospective employers), List of instructions, and Completion certificate. Handouts and a slide presentation augmented the discussion of this new program.

Sherry Southard presented how Oklahoma State University gives students an opportunity to gain work experience even during a lean economy, when companies are cutting back. Students are usually not paid, but receive course credit by completing projects for faculty and administrators at the University and for persons in business, industry, government, and the local community.

The suggestions on how to select projects are of interest to anyone wanting to start an internship program and to those in business, industry, and government. It is a way for projects to be completed at minimal cost, creating benefits for both students and employers.

Dr. Southhard discussed the required academic work, the total hours required for completing the project rather than a specified number of hours worked weekly, the procedures involved, and the evaluation of the student by the employer. Sample internship projects were summarized, showing the different types of projects that can be used effectively for this type of student internship experience.

Dr. Sherry Little and Peggy Cathcart discussed developing student internships at San Diego State University, with Dr. Little presenting the academic procedures and Mrs. Cathcart presenting an industrial viewpoint in developing internships. The Scientific and Technical Writing Certificate Program now offered at San Diego State University and how the student internship program relates to the whole program were discussed.

The certificate program requires students to complete 21 units of course work. At the end of the course work, students may elect to enroll as an intern, where they are assigned to work in a technical publication department. They work on actual writing projects under the joint supervision of the industrial coordinator and the course instructor. Developing these internships was closely related to the cooperation of the local industrial and business community, the San Diego Chapter of STC, and the academic community through their participation in an industrial advisory committee. The procedures followed by the students to apply for an internship position, which may be paid or unpaid, for 3 units of course credit were discussed. The evaluation procedures and the coordination of the student's work experience are shared by the instructor and the employer.

Peggy Cathcart, providing an industrial view, presented her experiences in directing the work experiences of interns. She discussed how she planned the students' work, identified tasks students could do, and developed instruction that students needed to apply the skills they had learned in their courses. She discussed how students moved from project to project to learn the processes of technical communication at its various stages of production, and gave one employer's view of the effectiveness of the internship experience for both students and employers.

Certainly the different programs discussed in this session shared one view: the internship, cooperative program is an excellent way to give students the needed on-the-job experience to qualify them, ironically, for entry-level positions. It gives employers the benefit of employable technical communicators with little risk, and allows all involved and committed to educating technical communicators a chance to work together in this common endeavor to their mutual benefit.

Developing Student Internships for Technical Writers
An Industrial View: Developing Student Internships

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ABSTRACT

Since May, 1982, the Department of English and Comparative Literature at San Diego State University has offered a certificate program in technical and scientific writing. Students enrolled in the program must take 21 semester hours to complete the program. All students must complete 9 hours of required courses in writing; the remaining 12 hours are chosen from a list of recommended courses. Which courses students take depends on whether they have technical or nontechnical backgrounds. When students finish the required courses and 9 hours of the recommended courses, they may elect to enroll as an intern. During internships, students are assigned to work with a technical writer in a technical publication department where they are involved with actual writing projects under the joint supervision of the intern's industrial coordinator and the course instructor. Developing these internships has demanded close cooperation between industry and the university in planning educational experiences that give students on-the-job experience to enhance their employability but will not, at the same time, place unreasonable demands on the resources of industry. Objectives for the internship are developed by the student, the student's industrial coordinator, and the supervising instructor. The supervising instructor from the university visits the student intern on the job, views samples of the student's work, and talks with the industrial coordinator to see how the intern is doing. At the end of the internship period, the student writes a report on his experience and submits samples of his work to the course instructor. The industrial coordinator evaluates how well the intern has met the established objectives before the student earns course credit for the internship. Several successful internships have been completed, allowing both students and technical publication departments to profit from the experience.

INTRODUCTION

Before I discuss the internship program that has been developed at San Diego State University, I would like to describe for you briefly the certificate program at the university and discuss how the student internship program relates to the whole program.

The person you see here with me was instrumental in beginning this opportunity for students to have actual work experience to augment their course work in the certificate program, and I would like to introduce her to you now.

Peggy is Head of the Publications Division at the Naval Ocean Systems Center in San Diego. She has offered student interns experience in both writing manuals and research and development reports. She will tell you about her part in developing internships in just a moment. But first, I'll tell you about the certificate program in which the internship experience plays its part.

The Department of English and Comparative Literature at San Diego State University is now offering an interdisciplinary certificate program in technical and scientific writing. It is designed for those who wish to prepare for careers in technical or scientific writing and who, either as SDSU students or members of the community, are interested in increasing their salable skills or enhancing their career mobility.

Because people skilled in technical and scientific writing are increasingly in demand by industry, technical writing is a viable occupation for students in nontechnical degree fields if they have some technical and scientific courses; and it is equally suitable for the technical and scientific students who have good writing skills. Thus, the program is adaptable to those students enrolled in a nontechnical, scientific, or technical degree program. Non-SDSU students may also enroll through the Open University program of the College of Extended Studies.

THE PROGRAM

Students must complete 21 units. All students must complete the following required courses:

English 500W Advanced Composition	3 units
English 304W Technical Writing	3 units
English 579 Topics in Technical Writing	3 units

Students must also complete an additional 12 units of recommended courses. These courses will vary according to the backgrounds of the students. Students with technical or scientific backgrounds must take writing courses; those with nontechnical or nonscientific backgrounds must concentrate on technical or scientific courses. All students are encouraged to take a computer science and a graphics class.

The 12 units provide the students with a great deal of flexibility in establishing their programs, allowing individualized programs.

Students develop the program after consulting with the Director of the program, who must approve the courses they select.

When students finish the required courses and 9 units of the recommended courses, they may elect to enroll as an intern. Several students have completed their internships and more job positions for interns are currently being developed. Eventually, a new course, Internship in Technical Writing, will be added to the catalogue, but now students may enroll through a Special Problems class. During internship, students are assigned to work with a technical writer or in a technical communication department where they are involved with writing projects under joint supervision of the intern's industrial coordinator and the course instructor. It includes a project and internship conferences, with at least one visit by the instructor at the job site.

How are these "slots" found? Actually, they grew logically from the procedures followed in developing the certificate program. Although I don't want to go into detail about these procedures, I do want to mention a few steps taken that have added to the success of this program.

INDUSTRIAL AND COMMUNITY INVOLVEMENT

Obviously, a program designed with such a focus on occupational ends demands involving industry in its development so that the program will reflect the needs of the industrial community. As the program was being developed, the activities within the University were augmented by activities in the industrial and business community of San Diego county.

Research identified industries involved in technical writing and needs were surveyed to determine the potential job market and the skills needed by local industries. The San Diego Chapter of STC and its Education Committee were also involved in developing this program.

The most significant task in achieving industrial involvement, however, was establishing an industrial advisory committee that meets once a semester. Certainly the many advantages of such a committee far outweigh the problems of initiating and maintaining its existence in a liberal arts educational climate that frequently eschews involving itself in occupational pursuits.

The members of the committee are all technical writers and publication managers in San Diego county. At meetings, they provided advice on the list of courses I had developed, reviewed the proposal for the program and all steps in developing the program, maintain a continual evaluation of the progress of the program, and give advice on changes to keep it current. They have proven to be invaluable as sources of internship openings and as publicizers for the program. They are certainly a most important adjunct to the educational process of developing the certification program at San Diego State University, bridging the gap that frequently exists between school and the world of work. Without their strong support, I am certain the program would not be as successful as it has become. I might add, Peggy is also a member of this advisory committee.

STUDENT INTERNSHIPS

Now that I have described the certificate program and discussed how the student intership relates to the whole program, I would like to talk about the internship itself. Peggy and others have worked closely with me in these beginning stages of developing experiences for students that will enhance their employability without placing unreasonable demands on the resources of industry.

She was a director of a pilot project, supervising the first student interns in the program. She will tell you how she planned the student's work experience, identifying tasks the students could do, and developing the instruction that students needed to apply the skills they had learned in their courses.

All of us were committed to making the experiences for the students real and meaningful, not using them in "go-fer" roles, but as potential future technical writers. Yet, we also realized the demands on time and personnel that taking on this responsibility places on industry. We hoped as well that the students would be able to contribute much to this experience, not being a complete liability, but a person who had considerable skill to contribute to the workload of industry.

Before we hear about this pilot project, then, I would like to explain the general procedures students go through in their internships. Students early in the application process determine whether they will take the internship option by filling out an internship application card. They indicate on this card their background and job intention and estimate when they will be ready for internship and their preference for full-time or part-time positions. I try to match this information with similar information I have collected on the internship employer cards. Students contact me for referrals to these potential employers. The student must then interview and compete for the internship position. Once accepted by the employer, objectives for the internship are developed by the student, the student's industrial coordinator, and the supervising instructor. The supervising instructor from the University visits the student intern on the job, views samples of the student's work, and talks with the industrial coordinator to see how the intern is doing. At the end of the internship period, which must be 150 hours, the student writes a report on his experience and submits samples of his work to the course instructor. The industrial coordinator evaluates how well the intern has met the established objectives before the student earns course credit for the internship.

So now we are ready to hear about the pilot interns Peggy has supervised.

INDUSTRIAL DEVELOPMENT

The employer who accepts responsibility for working with student interns must be prepared to devote considerable time and effort to the program.

The training must be multifaceted, if the intern is to receive the skills necessary to function in an actual work environment. Division of the training into two parts – (1) orientation into the publications process and the writer/editor's role and (2) actual writing and editing practice – provides the intern with the best training program.

During the first part of the training, basic information on the six stages of the publications process – editing, author conferences, production, proofreading, printing, and distribution – is provided, and the role of the writer/editor is explained. The fact is stressed that the writer/editor is in charge of the document through these various phases; he/she is responsible to the author for interacting with the personnel that perform the various documentation functions. Information concerning corporate restictions and requirements for documentation is also supplied. The importance of the writer/editor's role in representing management's requirements is stressed; the role of the writer/editor is presented as that of an interface between the author and management.

As the training continues, the intern also spends time with librarians, photographers, production personnel, and printers. The librarian explains the research techniques that the writer/editor will require to verify data in documents. This meeting also provides the intern with an idea of how librarians and writer/editors interact and are mutually concerned with specialized information and its transfer from creators to users. The photographer explains basic photographic techniques and how the writer/editor can work with the photographer to improve a document; photographic facilities are also toured. Information concerning specific production techniques – the preparation of artwork, the "marrying" of text and visual elements of a document, and the advantages and disadvantages of word processing equipment – is provided by production personnel. If possible, the intern operates equipment used in the production process. The local printer provides a tour of the printing plant, an explanation of various printing processes, and changes in the printing industry.

During these orientation sessions, the role of the writer/editor is continually emphasized, i.e., how the writer/editor makes decisions, based on a sound working knowledge of these areas, that affect the final use of various types of documents.

In the second part of the training, the intern prepares documents, i.e., the intern is given either writing or editing assignments and follows them through all publication stages. The level of difficulty of the writing or editing assignment is based on the intern's past experience, if any, and background in science and technology. The intern writes or edits the assigned document, schedules and conducts meetings with the author, oversees the production process, participates in proofreading the document, supplies standard and special printing instructions, and works with the author to determine distribution requirements. All assignments are reviewed by experienced writers or editors before scheduling of the author's conference. During this review, information on matters such as hyphenation, arrangment of tabular material, preparation of artwork, headings, and verification of certain factual data is supplied. There are two ways that this review can occur: One writer/editor can be assigned to review all the intern's work or different writer/editors can review different assignments. The latter practices work better, as the intern assimilates each writer/editor's particular skills.

Thus, this mixture of training provides the intern with (1) knowledge of the publications process and the writer/editor's role in this process and (2) experience in writing or editing of various documents. The actual "production" of a document – from manuscript stage through printed copies – gives the intern the experience of actually producing a document and, if dissemination restrictions do not apply, concrete examples of his/her work.

It is important that the intern be introduced to various types of documentation, audience analysis, and reading levels. Most of the intern's assignments are based on his/her area of interest, e.g., technical reports, software documentation, hardware manuals, proposals, brochures (public relations writing for technical projects), and specialized engineering documents (safety plans, reliability plans, or specifications). However, there must be exposure to other areas. This is usually accomplished by 8-hour orientation sessions with writers who specialize in these areas.

Despite the time and effort that this type of training program entails, there are advantages for the employer. Of primary importance is knowledge of having contributed to enhancing the professionalism of the technical communications field. Others include the opportunities of watching the intern gain confidence in his/her ability to contribute to the understanding of technical information and of overseeing the development of the intern's writing and editing skills. The possibility also exists of hiring these interns on a permanent basis after their training is completed.

The employer must remember, however, that the purpose of the intership program is to provide training for the intern; it is not a program to provide "free" help for the employer. When approached in this manner the possibility of the program working properly can be achieved and the employer will experience the benefits previously discussed.

A New Technical Communication Co-op Program

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ABSTRACT

In cooperation with colleges and employers in the greater Rochester, New York area, the Rochester Chapter of STC has developed a new and unique Technical Communication Co-op Program. It is unique in the sense that it combines the strengths and attributes of traditional co-op programs and internships.

The Program provides an opportunity for qualified students in communication-related disciplines to integrate classroom theory with field experience in a professional setting. The Program is an excellent way for employers in the community to find qualified communicators at a reasonable cost and minimum risk. The Program also provides a variety of additional benefits for the employer, student, colleges, and the Society for Technical Communication.

As in traditional co-op programs, a student participating in the Technical Communication Co-op Program receives monetary compensation from the employer. As in traditional internships, the student receives school credit upon successful completion of the job and appropriate evaluation.

The program description and other program materials have been combined into one information packet. Among the contents of the packet are the program guidelines, a job description form, a learning contract, an evaluation form, and a completion certificate. The program guidelines outline the eligibility requirements, the responsibilities of all program participants, and the operational procedures.

The Rochester Chapter of STC has played an instrumental part in this Program since its inception approximately one and one-half years ago. Initially the chapter provided consultation and guidance in setting up the Program and later approved the Program at the Rochester Chapter level. Presently, the Rochester Chapter, through the Education Committee Manager, President, and Past President, has assumed the role of liaison between employers and participating colleges.

INTRODUCTION

The Rochester (NY) Chapter of STC is proud to be a leader in the development and implementation of a new technical communication co-op program designed to create opportunities for students, employers, and colleges involved in the technical communication field.

The technical Communication Co-op Program (hereafter referred to as the Co-op Program or Program) is a unique program that combines the strengths and attributes of traditional co-op programs and internships. It is also a relationship of learning and cooperation that joins community employers, qualified technical communication students, and area colleges.

The Program provides an opportunity for qualified students in comminication-related disciplines to integrate classroom theory with field experience in a professional setting. The Program is also an excellent way for community employers to find qualified communicators at a reasonable cost and minimum risk.

The Rochester Chapter of STC has provided consultation and guidance in setting up the Program, and approved (accredited) the Program at the Rochester Chapter level. Presently, the Rochester Chapter, through the Education Committee Manager, President, and Past President, has assumed the role of liaison between employers and participating colleges.

BENEFITS

The Co-op Program provides benefits to all participants. Listed below are some of them:

To the Employer:

- qualified communicators
- reasonable compensation costs
- lowered recruitment costs and effort
- opportunity to evaluate employee suitability

To the Student:

- hands-on experience in the area of study
- work in a professional setting
- school credit
- compensation from the employer
- references for future employment

To the College:

- recognition for excellence in education
- cooperative relationships with community employers
- recognition for specific programs and instructors

DEVELOPMENT HISTORY

The idea for the Program evolved from a recognition of the lack of qualified technical communicators and of the frustrations experienced by employers, students, and colleges with regard to technical communicators. Employers placed help wanted ads for entry level writers who had experience. (How can one be experienced for an entry-level position?) Students graduating with degrees in Communications and English could not find any jobs—no one would hire them. College placement offices were frustrated by the inability to place qualified students in jobs with adequate pay.

Recognizing the lack of qualified communicators and the high level of frustration, Ed Taylor,the President of the Rochester Chapter of STC (1982–1983), started searching for ways to remedy the situation. He contacted a number of employers and colleges and solicited their ideas. In the process he found that there was quite a bit of interest on their part to have and train qualified technical communicators. He listened to their ideas, interests, as well as their reservations, and then drafted a proposal for a unique co-op program for technical communication students. This proposal incorporated safeguards for employers, students, and colleges.

Late in 1982 the proposal was presented to the Executive Council of the Rochester Chapter of STC requesting support. Upon approval, the Rochester Chapter officially became involved in developing this new program.

The President then made several presentations describing this program to interested employers and college representatives. This generated considerable interest and a commitment on the part of several people. They formed the nucleus of the Rochester Chapter of STC Education Committee. In cooperation with the committee, the President and other interested members of the Rochester Chapter, including student members, began working on the program in earnest in the spring and summer of 1983.

The work consisted of many committee meetings putting together a Program packet (discussed later). This involved presentations, discussions, and changing drafts of the various packet contents. The Education Committee also made the preliminary contacts with the other schools and employers.

By the end of the summer the Technical Communication Co-op Program was put into place. It was approved by the Executive Council of the Rochester Chapter of STC on September 13, 1983.

Since then, the Program has been functioning very well. It got off to a good start with several employers providing the job opportunities and several colleges enrolling students in courses designed with the Co-op Program in mind. Presently the number of employers and students has increased. As the Program is publicized, the Rochester Chapter hopes to get even more employers and colleges involved.

PROGRAM PACKET

All the materials needed for the effective implementation and operation of the Program are contained in a Program packet. These materials reflect the needs and requirements of the students, colleges, employers, and the Rochester Chapter of STC.

Contents of the Packet

- Program description
- Program guidelines
- Program forms
    - job description form
    - learning contract
    - performance appraisal form
- letters
    - letter to Rochester Chapter of STC members
    - letter to prospective employers
- implementation instructions
- completion certificate

Selected items are described briefly in the following paragraphs.

PROGRAM GUIDELINES

The Program guidelines outline the eligibility requirements, job description information, application procedures, evaluations, and general caution notes.

Any area college having a Co-op Program in effect that follows the guidelines is eligible. Eligible college students are those who are completing a program in a communication-related discipline at one of the participating colleges and who are recommended by their instructor and Co-op Program representative. Any employer is eligible who can provide the students with jobs in professional settings with the opportunity to learn their chosen communication-related professions.

For their work, Co-op Program students can earn at least the national minimum wage from the employer, as well as college credit from the school.

Information about available positions is provided on the Co-op Program Job Description Form. Copies of this form are sent to a coordinator who distributes them to Co-op Program college representatives for posting and distribution.

The process for applying for an available Co-op Program position is similar to a standard job application process. The student also completes a Learning Contract for use with the college. Through the Co-op Program college representative, an interested student sends a résumé to the prospective employer. A student who is considered for the job is interviewed, and if accepted, the student is employed for a contracted period. The employer notifies the appropriate Co-op Program representatives of the decision for each résumé submitted.

The hours per week, the total hours worked, and the details of scheduling are determined on an individual basis. This allows the flexibility necessary to accommodate different school calendars, as well as student and employer schedules.

The employer evaluates the student using the Co-op Program Employee Performance Appraisal Form and sends a copy to the designated Co-op Program college representative. The school awards credit per standard procedures, based on hours worked, a satisfactory completion of the job, and fulfillment of the evaluation agreement specified in the Learning Contract (e.g., a term paper). The student also receives a completion certificate signed by the employer, the school, and the President of the Rochester Chapter of STC.

The general notes address program restrictions and implications. For one, the Program does not guarantee future employment. The employer can terminate the contract prior to the end of the contractual period with the understanding that this may cause various hardships on the student (e.g., denial of school credit). Students are not placed with irresponsible employers. A student who leaves the Program voluntarily, prior to contract completion, forfeits course credit and is not eligible to reapply for the Co-op Program.

CO-OP PROGRAM FORMS

The three forms described next were all formulated by the Education Committee of the Rochester Chapter of STC.

Job Description Form

The job description form, completed by the employer, contains pertinent dates, a position title, and a general description of the position. The employer must also list specific responsibilities and any skills that are required.

Learning Contract

The learning contract was designed for use by the student and the college. The top part of the form contains the student's personal and educational data, employer placement information, and college data such as course number and instructor. The bottom part lists the learning objectives and an agreement on the terms of the student's evaluation.

Employee Performance Appraisal Form

Both the employer and student fill out portions of the Employee Performance Appraisal Form. The employer rates general performance categories on a scale of fair to excellent and checks off the appropriate box. For example, to evaluate the quality of work (thoroughness, neatness, and accuracy of work), the employer checks one of the following three categories: 1) Needs improvement, 2) Meets recognized standards, or 3) Maintains highest quality.

The employer also provides general comments and suggestions along with an indication of areas needing improvement. The student writes a self-appraisal with respect to job objectives and initial goals and expectations. The student also assesses his or her strengths and weaknesses.

LETTERS

I wrote two letters to introduce and publicize this Program. One letter was written to prospective employers. We used a variety of sources to locate these employers: Chamber of Commerce, Rochester Industrial Management Council, our own STC Membership Directory, public library, employment agencies, etc.

The letter to employers introduces the Program and briefly describes its benefits to the employer. In it is a list of the participating colleges and resource people to contact. We also enclosed copies of the program description and guidelines as well as a Job Description Form.

The letter to the Rochester Chapter members was used to publicize the Program and keep the membership informed of the chapter's activities. We also enclosed the letter to the employer and the Job Description Form along with a request to pass the materials on to their employers.

IMPLEMENTATION INSTRUCTIONS

A list of implementation instructions, compiled by the Rochester Chapter of STC Education Committee Manager, identifies the procedures that each participant must follow in order for the Program to function efficiently and properly. It also spells out the responsibilities of each participant.

COMPLETION CERTIFICATE

The completion certificate serves as an acknowledgement of the student's participation and can be used in the student's employment history portfolio. The certificate was made up by the Rochester Chapter's Education and Awards Certificates Committees.

CONCLUSION

As you can see from this description, there is a great deal of work involved in setting up such a program. It is not an easy task, however, it is not that difficult either and it is something that must be done. The key elements required for such a task are qualified, enthusiastic students, interested employers, dedicated college representatives, willing STC participants, and COMMITMENT on everyone's part.

A real need for qualified technical communicators exists in today's highly technical society. A successful Co-op Program fulfills that need and provides many benefits to all participants. And the rewards are countless.

STC, both at the chapter and society levels, can take pride in being recognized as a professional organization dedicated to the advancement of technical communicators in word and in deed.

Recent Research in Technical Communication Education

Susan Feinberg, Moderator

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What is the motivation for this session?

A significant problem in the technical communications field is that educators must constantly revise both courses and goals to keep up with the explosion in information and technology. These revisions are an ongoing process, and this session focuses on some research and innovations in teaching technical communication.

But educators need the help of their technical communication colleagues in industries and government agencies, because these areas contribute in an important way to the content of the academic courses in technical writing. It is only through cooperation of these three groups of technical communicators--industry, government, academia--that students will receive the best possible education in technical communication. So this session is directed toward all three groups and needs the feedback from each group.

What main points will be covered in the session?

The first paper by Dr. Susan Feinberg on the "Use of the Delphi Method to Model a Course in Technical Communication" is based upon research conducted under the auspices of the Society for Technical Communication. One hundred technical communicators from government, industry, and academia were asked to respond to a series of questionnaires that would develop the content of a course in technical communication. The model does not rigidly prescribe course content, but it does provide the items for a course in teechnical communication based upon the needs and perceptions of these three groups.

The second paper by E. Brett Monagle on "A Computerized Instructional Model for Functional Grammar" presents computer exercises for students in Technical Writing and Business English. The exercises are based on an analysis of grammatical errors in mechanics, punctuation, and misspellings and represent an improvement over the more traditional computer-assisted instructional programs in grammar. The program provides the student with the appropriate instruction and frees the instructor from the need to correct additional exercises.

The last presentation is a collection of "Student/Course Performance Goals and Evaluation for Intensive On-Site Writing and Briefing Courses" described by Dr. Freda Stohrer, Dr. Robert Weaver, Dr. Terrance Skelton, and Dr. John Muller. These presenters have designed short courses in oral and written communication for practicing professionals. They will be discussing the performance goals for the intensive one-week courses and the evaluation procedures for measuring the student's progress toward these goals.

Who might use the information and how?

The obvious audience, educators, is certainly not the only audience for this session. Technical comunicators from industry and government were an integral part of the research to model the course in technical communication, and they indicated their interest in the results of the questionnaires to which they responded. This session provides them with an opportunity to learn about the results to date.

The second presentation provides all communicators with insight into the uses to which the new technology is aiding education. Almost all work environments now have the hardware to provide learners with instructional packages to improve their communication skills. People in the audience will consider instructional packages that are easy to program and easy for learners to manipulate.

The third presentation actually demonstrates the measures used to evaluate the success of short courses and of participants in these short courses. The audience is invited to consider these measures and to use these measures in their own evaluations.

A Computerized Instructional Model for Functional Grammar

E. Brette Monagle

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ABSTRACT

This paper describes a model for a computer-assisted instructional program based upon an analysis of errors from the writings of Technical Writing and Business English students. The analysis focuses on identifying frequently occurring grammatical errors, errors in mechanics, punctuation errors, and misspellings which provide the basis for a computerized instructional program.

An analysis of over 150 randomly selected papers taken from 75 students in technical and business writing courses reveals that students' errors generally fall into a limited number of categories. These categories include common misspellings; the comma fault or comma splice; sentence fragments and run-ons; unclear pronoun reference and other incorrect use of pronouns; noun-pronoun disagreement; subject-verb disagreement; omission or misuse of commas; omission of the contractive apostrophe; omission or misuse of the possessive apostrophe; and overcapitalization or undercapitalization.

Each of these errors has a numerical code assigned to the error which the instructor uses to mark any error appearing on a student's paper. For each coded error, the student can summon an instructional package on the computer and complete computer exercises based upon the instructional package. Upon successful completion of the exercises, the student receives a printout which is submitted to the instructor.

Such a computer-assisted instructional program offers a number of advantages over more traditional computer-assisted instructional programs. First and most important, this program teaches to those errors that students actually make, thus eliminating instructional segments that attempt to teach to every aspect of grammar, mechanics, and punctuation. Second, because it has fewer instructional segments, these instructional segments are easier to program and easier for students to manipulate. Third, the instructor does not spend valuable classroom time on discussions of mechanics, punctuation, and grammar yet students receive the instruction they require in these areas. Fourth, by requiring students to complete the instructional modules in the program, the instructor is assured that they are receiving the appropriate instruction. Finally, the program frees the instructor from the need to correct additional exercises.

INTRODUCTION

A number of researchers have found that the teaching of formal grammar is an inefficient way to help students become better writers. According to Julie Stusrud Held, "of the 23 studies recorded in Stephan Sherwin's Four Problems in Teaching English, 22 found the teaching of traditional grammar to be ineffective in improving writing ability."[1] And almost all teachers of writing are familiar with or have at least heard of Richard Braddock's oft-quoted statement:

> ...the teaching of formal grammar has a negligible or, because it usually displaces some instruction and practice in actual composition, even a harmful effect on the improvement of writing."[2]

What has been overlooked in so many of these statements, however, is equally strong evidence that while formal grammar taught separately from writing does not transfer effectively to students' writing, functional grammar, that is, grammar taught in the context of students' writing, does have a salutary effect on their writing. According to Henry C. Mechel, author of Research on Teaching Composition and Literature, improvement of usage appears to be more effectively achieved through practice of desirable forms than through memorization of rules.[3] Researcher Roland I. Harris in a 1962 study found that students who considered problems in sentence structure...and concentrated on common errors which appeared in composition and learned inductively by way of example and imitation improved significantly.[4] In another study, C. C. Crawford and Madie Boyer also measured formal grammar against a usage method which involved writing original sentences and found this usage method to be effective.[5] While the evidence against the teaching of formal grammar is strong, there also exists enough research to suggest that functional grammar, or grammar taught within the context of students' writing, can be an effective means to improve their writing.

METHOD

Since research suggests that grammar instruction be based upon students' writing, I randomly selected 30 percent of the student writing folders from eleven sections of Business English and Technical Writing from the years 1979 to 1983 to determine which errors students make most frequently. For a base upon which to build an instructional model, I restricted my identification of errors in grammar, punctuation, spelling, and mechanics because the computer is particularly well-suited for this type of instructional package. Students' errors can be very closely approximated on the video screen, thus permitting students to see the relationship between their errors and the examples on the screen.

Two writing samples, taken from the beginning of the semester because they were more likely to contain the most errors, were selected from each folder. Analysis of these two writing samples from each student or a total of 150 writing samples showed that students made a limited number of errors although they made them repeatedly. The most frequent errors included common misspellings; the misuse or omission of the comma after introductory words, phrases, and clauses; the comma fault or comma splice; sentence fragments and run-ons; unclear pronoun reference and incorrect use of pronouns; noun-pronoun disagreement; subject-verb disagreement; omission of the commas between coordinate modifiers; omission of commas in a series of words, phrases, or clauses; omission of the commas to enclose interrupters; omission of commas to separate elements in dates, addresses, and after closings; omission of the contractive apostrophe; omission or misuse of the possessive apostrophe; overcapitalization or undercapitalization; misuse of the semicolon numbers not spelled out; and the misuse of the ampersand.

CODING

After identifying and cataloging the most frequent errors, I assigned a code number to each of the errors. Since comma misuse is one of the most frequent errors that students make, I grouped the comma instructional unit together. The instructional unit for commas is an example of how this coding works. All comma errors are coded under the general number of (1). However, since there are a number of comma errors which are possible, additional sub-coding was used. Thus, the omission of a comma after an introductory word is coded 1a; the omission of a comma after an introductory phrase is coded 1b; and the omission of an introductory clause is 1c. Commas omitted when separating two or more modifiers are 1g, and commas omitted when joining compound sentences with a conjunction are 1h. The omission of commas to enclose interrupters is 1i while the omission of commas to separate words, phrases, and clauses in a series is 1j, 1k, and 1l. Finally, the omission of commas to separate elements in date, addresses, and after closings is 1m, 1n, and 1o.

Misspellings are coded as (2), and the comma fault or comma splice because it indicates the failure to recognize where a sentence begins or ends and because it should not be confused with other comma errors is assigned number (3). Sentence fragments and run-ons are (4a) and (4b). Unclear pronoun reference is (5a) and (5b); noun-pronoun disagreement is (6), while subject-verb disagreement is (7). The omission of the contractive apostrophe and the omission or misuse of the possessive apostrophe are numbered (7), (8a), and (8b). Overcapitalization or undercapitalization is numbered (9a) and (9b). The misuse of the semi-colon is (10); a number not spelled out is (11), and the misuse of the ampersand is (12). The advantage of such a numbering system is that it is open-ended and can be expanded by breaking a category down into smaller sub-units.

EXAMPLE

Once a student's paper is marked with the appropriate numbers, the student can then go to the computer and feed the number into the computer to summon an instructional package and some exercises to do. See the sample of a student's paper which follows.

APEX WAREHOUSE
220 El Paseo Road
Albuquerque, New Mexico 88003

December 6, 1983

Mr. James E. Schwa
1220 East 71st Street
St. Louis, MO 60431

Dear Mr. Schwa:

I sent the six dozen stethescopes you requested in your letter of November 20. You should receive them within a few days.

I am enclosing several of our new brochures which feature Apexs 8a new line of x-ray equipment. I'm sure you will want to take advantage of Apexs 8a special introductory prices to order promptly.

I have enclosed a special order form, and I look forward to hearing from you.

Yours truly,

James B. Bonham
Manager

Once a student's paper has been marked, the student can feed the codes from the paper into a terminal and receive an instructional display which explains the grammatical principle or principles he or she did not understand. For example, the student in the sample above fails to insert the possessive apostrophe in the appropriate places. This student, upon feeding the number (8a) into the computer would see the following displays on the screen:

Frame I

THE FOLLOWING EXERCISES WILL HELP YOU UNDERSTAND THE POSSESSIVE APOSTROPHE AND THE SITUATIONS IN WHICH IT SHOULD BE USED.

FIRST, YOU WILL SEE HOW THE POSSESSIVE APOSTROPHE IS USED WITH NOUNS TO INDICATE POSSESSION.

SECOND, YOU WILL SEE THIS PRINCIPLE APPLIED IN SEVERAL SENTENCES.

THIRD, YOU WILL BE ASKED TO APPLY THIS PRINCIPLE YOURSELF IN SEVERAL SAMPLE SENTENCES.

Frame II

PRINCIPLE: POSSESSIVE APOSTROPHES ARE USED WITH NOUNS TO SHOW POSSESSION.

THE FOLLOWING EXAMPLES ILLUSTRATE THE USE OF THE POSSESSIVE APOSTROPHE WITH NOUNS TO SHOW POSSESSION.

1. THE DOCTOR'S OFFICE IS OPEN TO EVERYONE.

2. MARY'S TOYS ARE SCATTERED EVERYWHERE.

AS YOU CAN SEE, THE OFFICE BELONGS TO THE DOCTOR AND, THEREFORE, NEEDS A POSSESSIVE APOSTROPHE AND AN S TO INDICATE THIS POSSESSION. SIMILARILY, TO SHOW

THAT THE TOYS BELONG TO MARY, A POSSESSIVE APOSTROPHE AND AN S ARE ADDED TO MARY. YOU WILL ALSO NOTE THAT THE POSSESSIVE IS USUALLY USED WHEN A SECOND NOUN FOLLOWS A FIRST NOUN ENDING IN AN S. NOW THAT YOU HAVE REVIEWED THE USE OF THE POSSESSIVE APOSTROPHE, YOU WILL HAVE AN OPPORTUNITY TO PLACE THEM IN SOME SAMPLE SENTENCES.

Frame III

PLACE THE POSSESSIVE APOSTROPHE IN THE APPROPRIATE PLACE.

> THE OPERA STARS CONTRACT STIPULATED SHE WOULD SING ONLY THREE DAYS A WEEK.

The student must now punctuate the sentence. If the student does this correctly, the terminal responds with a congratulatory comment and the correctly punctuated exercise is printed for submission to the instructor. If the student fails to punctuate the sentence correctly, the terminal shows the sentence with the appropriate punctuation and the instructional frame (Frame II) is repeated. The student is then asked to complete another exercise.

Frame IV

PLACE THE POSSESSIVE APOSTROPHE IN THE FOLLOWING SENTENCE TO SHOW POSSESSION.

> OFTEN WE HURRY THROUGH OUR DAYS WORK WITHOUT CONCERN ABOUT WHAT WE ARE DOING.

A correct response results in a congratulatory comment and a printout of the sentence. An error results in a display of the sentence correctly punctuated. The instructional frame (Frame II) is then repeated, and the student is asked to complete a third exercise.

Frame V

PLACE THE POSSESSIVE APOSTROPHE IN THE FOLLOWING SENTENCE TO SHOW POSSESSION.

> FAMOUS BALLPLAYERS UNIFORM NUMBERS ARE OFTEN RETIRED WHEN THE BALLPLAYERS LEAVE BASEBALL.

Again, a correct response results in a congratulatory message and a print-out of the exercise. If the student fails to place the possessive apostrophe correctly the third time, the student still receives a print-out to submit to the instructor to show that the instructional module has been completed. The student can then consult with the instructor for addtional help.

CONCLUSION

The instructional package for the possessive apostrophe demonstrates how the computerized instructional modules for teaching grammar and mechanics to Technical Writing and Business English students can work.

Such a system offers a number of advantages over more traditional computer-assisted instructional modules. First, and most important, this program teaches only to those errors that students actually make, thus eliminating instructional segments which attempt to teach to every aspect of grammar, mechanics, and punctuation. Second, because fewer instructional segments are used, these modules are easier to program and easier for students to manipulate. Third, the instructor does not spend valuable classroom time on discussions of mechanics, punctuation, and grammar yet students receive the instruction they require in these areas. Fourth, by requiring students to complete the instructional modules in the program and submit the printout to the instructor, the instructor is *assured* that the students are receiving the appropriate instruction. Finally, the program frees the instructor from the need to correct additional exercises.

FOOTNOTES

1. Julie Stusrud Held, "Teaching Writers How to Write: What Works?" *STC Technical Communication Journal of the Society for Technical Communication* 30 (2) (Second Quarter 1983): 17-19.

2. R. Braddock, R. Floyd Jones, and Lowell Schoer, *Research in Written Composition* (Champaign, Illinois: National Council of Teachers of English, 1963).

3. See Martha Kolln, "Closing the Books on Alchemy," *College Composition and Communication*, 32 (2): 139-151, for a summary of Mechel's conclusions in *Research on Teaching Composition and Literature* which reviews much of the same research in Braddock's work yet comes to significantly different conclusions.

4. Braddock.

5. Braddock.

Student/Course Performance Goals and Evaluation for Intensive On-Site Writing and Briefing Courses

Robert B. Weaver, Freda F. Stohrer, and Terry Skelton

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Associate Professors of Technical Communication

The Air Force Institute of Technology now offers two intensive five-day courses, one in technical writing and one in briefing preparation and presentation. The goal of both courses is to help students enable successful action in their workplace. Writing students are evaluated by an editing exercise. Briefing students are evaluated by four simultaneous measures of briefing effectiveness. Both courses are evaluated by end-of-course critiques and follow-up surveys of students and their supervisors. Results to date are encouraging.

Like many other colleges, the Air Force Institute of Technology (AFIT) offers both degree-granting programs and professional continuing education. Before this year, instruction in technical writing and briefings had been almost exclusively in the degree-granting programs. Short courses for practicing professionals had been presented only occasionally in response to specific requests and, sometimes, extensive negotiations. This past year, however, we have designed two intensive five-day courses, have completed six pilot offerings of each course, and are delivering regular offerings--both here in the school and on-site. The student population consists of (a) military officers and noncommissioned officers and (b) military service civilian employees with some supervisory responsibilities (GS-5 and above). Although we require no specific educational attainment, nearly two-thirds of our students are college graduates. Neither course is remedial: students for the technical writing course are expected to have good working competence in the use of English, and students for the briefing course have no speech disorders or other pronunciation problems.

The Courses

The "Technical Writing Seminar" (COM 210) prepares students to produce clear, useful, economic written communications on technical subjects. It includes training in analysis of the communication situation; the determination of appropriate style, tone, and form; evaluation of information and its sources; local and general conventions; and a review of grammar, expression, mechanics, and readability standards.

The "Briefing Preparation and Presentation" course (COM 215) consists of instruction and practice in delivering informative and advocacy briefings on military subjects to Air Force and other military audiences. Course content includes organization, audience analysis, delivery techniques, and the preparation and use of visual aids. Special attention is given to building confidence and the presentation of self (nonverbal communication).

The Problem

We have two clients to satisfy, the students and their supervisors. To establish and satisfy performance goals for both the students and the two courses, we have attempted to answer three questions:

(1) What do the students need to improve their technical writing and briefing skills?

(2) How can we give the students what they need in the time we have?

(3) How do we know when and how well we have satisfied those needs?

The following discussion outlines what we have done and are continuing to do to answer these questions. First, we discuss methods for evaluating student performance in the writing and briefing courses and, second, methods for evaluating how well we have met our course goals.

Student Performance in the Technical Writing Seminar

The stated goal of our five-day technical writing seminar is to teach students to write clear, useful, economic prose, or more clearly stated, to help students produce writing that enables successful action. We believe that our students find greatest difficulty not in getting their ideas on paper or in finding the subject matter must suited for their letters and reports, but in revising--or editing--their initial efforts. We thus do very little in-class "writing." The course has been constructed to emphasize editing skills and application of these skills in individual sentences. We concentrate on exercises designed to reinforce editing skills in each of the seminar's principal subject areas.

The course is organized around the following major emphases:

1. Grammar; structure as it determines meaning
2. Semantics; individual components as they determine meaning
3. Economy exercises; style and tone as well as brevity as they affect audience response
4. Readability standards; accepted measures of reading difficulty as they illustrate the emphases taught

These segments are a means to several intermediate goals: analysis of the communication situation; determination of appropriate style, tone, and form; local and general conventions; grammar and mechanics; and readability standards.

To evaluate the students' actual performance, we administer a test of writing ability before and after the course. Because we are concerned exclusively with on-the-job writing, the test we chose was a short piece (two paragraphs; 189 words) of technical prose describing a hypothetical portable landing mat to be used by the U.S. Air Force and the subsequent disasters in actual tests. The audience supposed by the test posed no problem inasmuch as our students share a common audience. This audience has reasonably well-known expectations of form, style, vocabulary, formality, ingredients of the "bureaucratic style," in short.

We salted the piece with various grammatical, mechanical, and usage problems representing each of the areas emphasized during the course. Students are not asked to rethink or reorganize the passage; they are asked only to edit, leaving out no information. Students revise the passage as soon as they arrive on Monday morning and again on Friday afternoon. On each occasion we give them one hour to do the job. After this second revision, we have students compare both of their versions, and discuss thoroughly the possible alternatives for change. The students then return the papers to us, and we evaluate the tests for our records, using a structured evaluation sheet (see Figure 1).

On our evaluation sheet we list 18 possible revisions in the four sentences of paragraph one. Among these are inappropriate inverted sentence structure, subject-verb agreement error, ornate diction, and awkward passive voice.

Preliminary results are interesting. In every instance but one, more attempts were made to revise the problem areas in the post test than in the pretest. The one exception was a gross subject-verb agreement error, a typographical error in reality, which had also introduced non-idiomatic usage. All tests tabulated, both pre and post, had revised this error. The other problem areas showed increases in revision from eight percentage points (from 50% to 58%) for a subtler subject-verb agreement error to 41 percentage points (from 28% to 69%) for rearrangement of an inverted passive construction. These are positive and encouraging results.

There are several problems with administering a skills test of this sort. First, students can introduce errors where there were none before. Second, tallying responses is tedious and time-consuming. Third, some students rush through the post test possibly because of boredom with doing the same task twice or because they are rushing to finish and catch their plane home. We are now considering a revision of the test to alleviate some of these problems. Nevertheless our response to this effort has to be pleased albeit thoughtful.

Student Performance in the Briefing Preparation and Presentation Course

The purpose of technical briefings is identical to that of technical documents: to enable successful action. The two communication situations differ chiefly in the immediacy of feedback. Usually, briefers learn immediately following their presentations how successful they have been. In the informative briefing they must convince the audience to accept the information they have presented as true and meaningful. In the advocacy briefing they must convince the audience to take some action. Success in either case apparently involves the same elements.

To determine the elements of a successful briefing in the military situation we surveyed

	Yes	No	
Paragraph 1			
Sentence 1:	___	___	Simplify "utilization"
	___	___	Simplify "availability"
	___	___	Delete "unique"
	___	___	Reduce "theaters of operation"
	___	___	Reduce "does not permit"
	___	___	Delete passive voice
	___	___	Correct S-V agreement
Sentence 2:	___	___	Reduce to one modifying phrase
Sentence 3:	___	___	Delete "along the edges"
	___	___	Delete passive voice
	___	___	Reduce "sufficiently large size"
	___	___	Reduce "surface of the ground"
	___	___	Delete "have been configured"
	___	___	Correct S-V agreement
Sentence 4:	___	___	Reduce "The design of the interlocking landing mat panel edge" (e.g., The interlocking panels)
	___	___	Delete empty verb "is"
	___	___	Delete redundancies: "adjacent," "rotational," etc.
	___	___	Reduce passive "is encountered" to verbal "encountering"

Figure 1. Editing evaluation sheet

senior officers in twelve directorates of the Aeronautical Systems Division of Air Force Systems Command. Respondents were all experienced briefers, accustomed to competing with one another and with other Air Force organizations for scarce manpower and financial resources. First, we asked them to "list specific techniques which make briefings effective." Then, as a check, we asked them to "list specific shortcomings which make briefings ineffective." The results supported our personal experience as well as our previous informal surveys of student needs and course expectations. The elements most frequently cited were:

1. Organization (appropriate, logical)
2. Delivery (confidence, eye contact, voice inflection, voice projection, use of notes)
3. Content (subject knowledge)
4. Audience Analysis
5. Visual Aids

These elements, then, furnished the subjects for our lectures and workshops during the first two days of the course and the focus for evaluation of student performance in their five required briefings - one briefing for each student each day of the course.

Because oral communication involves presentation of self as well as content, student progress can be measured only subjectively. Therefore, we use four simultaneous measures which more often than not reinforce each other. Evaluation, then, is less exact but more comprehensive than that in the technical writing course. First, after each briefing, the student receives four written critiques which evaluate 11 important variables (see Figure 2)--one from the instructor and three from fellow students. Second, the student reviews a videotape of each briefing. One channel of the sound track contains instructor comments made during the briefing, which the student can hear separately from or together with the briefing sound track, a technique we call "voice-over." Third, immediately following each briefing, the student receives an oral critique (itself a structured impromptu briefing) from a fellow student. Finally, in one briefing the student presents proposed solutions to three problems in his job, from which the class selects one problem for further discussion. The briefer's unstated purpose is to persuade the audience to choose the problem he or she prefers to discuss further. Success or failure in this effort provides the fourth measure.

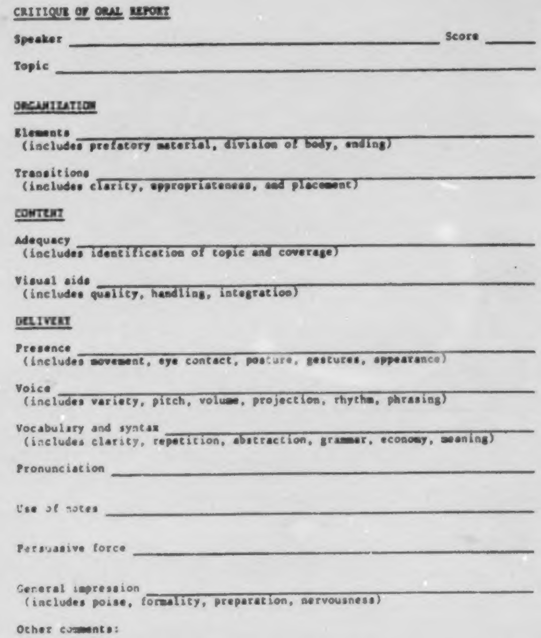
These subjective measures do not permit us to discriminate finely among students but, in sum, do provide the means for determining which students are awarded a Certificate of Completion for the course. In addition, at course completion we ask all students to vote for those they consider the two best briefers in the course. The winners are designated on their Certificates of Completion as having completed "with honors." So much for evaluating student performance. Remaining is the need to evaluate how well we, the instructors, have met the overall course goals.

Course Goals and Evaluation

Do these courses improve the communication skills of our students? How can we measure the quality of instruction? Both courses are based on the premise that technical communication enables successful action. We have also based our instruction on this premise. We tell our students that "the quality of a technical communication is measured in the context in which it is intended to to work. It is not always possible to do so, but the closer we get to testing in context, the closer we can measure the quality of the communication." This principle also applies to course evaluation. Our ultimate goal is to test these courses within the context of the workplace. We can achieve this goal by establishing two methods of course evaluation: 1) a detailed end-of-course critique and 2) a follow-up survey of our graduates and their supervisors. The end-of-course critique provides an immediate assessment of each class while the experience is still fresh in the student's mind. Any problems that can be corrected before the next session are addressed quickly. In addition to serving this function, the course critique is a source of questions for the survey. Student responses have generated questions about the communication practices of government employees and whether our students can apply our instruction on the job. According to the course critique, both courses relate well to the communication training needs of our students.

Overview of Course Critique Results

A standard end-of-course critique form is used for all of AFIT's professional continuing education courses. It consists of 38 closed-ended questions and 3 open-ended questions. Much of the



CRITIQUE OF ORAL REPORT

Speaker ______________________ Score ______

Topic ______________________

ORGANIZATION

Elements ______________________
(includes prefatory material, division of body, ending)

Transitions ______________________
(includes clarity, appropriateness, and placement)

CONTENT

Adequacy ______________________
(includes identification of topic and coverage)

Visual aids ______________________
(includes quality, handling, integration)

DELIVERY

Presence ______________________
(includes movement, eye contact, posture, gestures, appearance)

Voice ______________________
(includes variety, pitch, volume, projection, rhythm, phrasing)

Vocabulary and syntax ______________________
(includes clarity, repetition, abstraction, grammar, economy, meaning)

Pronunciation ______________________

Use of notes ______________________

Persuasive force ______________________

General impression ______________________
(includes poise, formality, preparation, nervousness)

Other comments:

Figure 2. Briefing critique form

form requests demographic data. For example, the form provides for 20 different work areas. Both courses reflect the heterogeneous composition of most professional continuing education courses at AFIT. We have identified at least 14 different job titles among our students. The courses have drawn engineers (civil, chemical, electrical, and mechanical), computer programmers, contract specialists, financial specialists, and personnel staff specialists. In addition to defining these functional differences among the students, the critique produced the following profile of our students and their assessment of the course.

Reasons for taking the courses. Few of our students work primarily as supervisors. Most volunteer to take the courses because they see (or their supervisors see?) a need to improve writing or briefing skills. About three-fourths of the students give this reason for enrolling. Some students evidently believe the courses may be required for advancement someday. A few students enroll involuntarily because their department had to meet a training quota.

Relevance of course objectives to job. According to a majority of the students, the courses' objectives are appropriate to their job requirements. About 65 percent of the briefing students and 75 percent of the writing students consider the objectives "completely appropriate" to their job requirements.

Overall difficulty of the course. An average of 84 percent of the writing students describe their course as "challenging but fair." An average of 91 percent of the briefing students describe their course the same way. The demands of preparing and delivering five briefings in five days may account for the higher rating. The level of rigor appears to be just right in both courses.

Applicability of exercises to course content. The students respond well to the exercises used in both courses. In the first five sections of the writing course, every student said the exercises were "adequate to illustrate course material," the highest rating possible. The smallest percentage of students with this response was 89.5 percent. In the briefing course, the percentage of students choosing this response ranged from 82.6 percent to 92.9 percent.

Value of exercises in achieving course objectives. The students were nearly unanimous in their assessment of the exercises used in the two courses. Every student in two sections of the writing course said the exercises were valuable in achieving course objectives, the highest rating possible. The lowest percentage of writing students with such a rating was 93.1 percent. The percentage of briefing students who considered their course exercises valuable ranged from 87 percent to 92.9 percent.

Relevance of course objectives to management's needs. When asked whether the course objectives relate well with their organization's management needs, 100 percent of the students in two writing sections said "Yes." The lowest percentage of writing student with an affirmative response was 97.2 percent. In three briefing sections, 100 percent of the students said "Yes" to this question. The lowest percentage of briefing students to respond affirmatively was 88.9 percent.

In effect, then, six sections of writing students reported that they found the review of functional grammar, the introduction to semantics, and the series of editing exercises useful and appropriate preparation for their professional writing tasks. The briefing students accepted the challenging series of briefings required to pass the course. The emphasis of the briefing course on problem definition and a constantly changing rhetorical situation appears appropriate for the kinds of presentations required of professionals in the Department of Defense.

Survey of Graduates and their Supervisors

However, will this view of the courses persist months after the end of class? Will our former students be able to apply what they have been taught? And will their supervisors find any significant improvement in the communication skills of their personnel? To answer these questions, we have designed a follow-up study. We intend to regularly survey the graduates of both courses and their supervisors. Three objectives constitute the study:

1. To determine from our graduates' perspective whether the two courses have addressed the communication training needs of DoD professionals.
2. To determine from the supervisors' perspective whether the two courses satisfied management's criteria for communication training.
3. To describe the communication roles of DoD professionals and modify instructional strategies as necessary.

Each questionnaire consists of three parts: Part I Background Information; Part II Course Evaluation; Part III Final Questions and Comments. Data from Part I will enable us to compare the communication responsibilities of the graduates with those of their supervisors. Does a description of the supervisor's communication tasks provide a picture of the graduate's future responsibilities? Such a picture may help us better understand management's training expectations. Part II will produce two kinds of response from the graduates: 1) First the graduates evaluate the importance of each course topic, "readability" for example; 2) second, the graduates evaluate how well the topic was covered in the course. The supervisors will be asked to evaluate only the importance of the course topics to the graduate's job. The results from Part II should reveal any important differences in how our graduates and their supervisors define communication responsibilities. Part III will measure the effect, if any, the courses have had on the graduates' approach to communication. Again, the graduates' perceptions will be matched with those of the supervisors. The survey should prove a useful test of our ability to teach communication skills to such a wide range of professionals. And in performing this test, we again demonstrate to our former students the importance of testing our product for quality within "the context in which it is intended to work."

Use of the Delphi Method to Model a Course in Technical Communications

Susan Feinberg

ABSTRACT: This paper presents the results so far of a research project that surveyed 100 technical communicators from industry, government, and academia. These communicators, members of STC, are being asked to reach a consensus about what constitues a course in technical communication. The technique used to establish consensus is a modification of the Delphi method. Three questionnaires are being sent to these STC communicators. The first questionnaire asked them to name topics for a course in technical communication. From their responses we have selected 33 topics that must now be placed in 8 categories in the second questionnaire. At the end of the project, this course model, with its state of the art content, will be of benefit to students and communicators alike.

The Purpose for the Research Project

Rapid advances in technology have created an information explosion. Because of this explosion educators must redefine and update the content of their technical communication course. In an article in THE AMERICAN BUSINESS COMMUNICATION BULLETIN, R.S. Kellner notes that "There is no consensus or even close agreement about what constitutes a technical writing course." No consensus study has been undertaken, and there is a "need for a more comprehensive survey of what is being taught in the technical writing classroom." [6]

The purpose of this research project is to model a course in technical communication based upon a consensus among communicators as to what constitutes a course in technical communications. Technical communicators in industry, government and academia are being asked to respond to a series of questionnaires.

From the data provided by these questionnaires, the researchers analyze the data using statistical techniques and develop the content for a course model in technical communication. Such a model does not, of course, rigidly prescribe course content, but it does provide a basis of established needs for communicators and learners.

The Background for Measuring Consensus

The Delphi method is the accepted method of measuring expert opinion as it moves toward a group consensus. This method has never before been applied to the field of technical communication [1,2], and it is the method I am using to establishing consensus for the content of a course in technical communication.

The Delphi method provides a forum for group communication especially useful when the group is too large for meaningful face-to face interaction. Although the group may start with strongly divergent individual views, they will be asked to focus on areas of agreement. In general, the Delphi method explores an issue by moving from individuals conveying thoughts and feelings to group consensus in a decision.

The framework for the communication is structured by the researcher who asks the questions, analyzes the input, and provides feedback to the participants of the group. The researcher essentially takes the qualitative information and places it on a quantitative scale through the use of statistical analyses. In this way, the Delphi method can be used to develop the content of a course model in technical communication.

The Delphi method, described by Helmer[4], was first employed in this country for the purpose of achieving consensus among experts in estimating the probable effects of a massive bombing attack on the United States. There have been hundreds of Delphi experiments involving the forming of consensus on the evaluation of strategies, the factors influencing the quality of life, and the future of communication services in the home, just to name a few. [8]). The Delphi technique was also used by Batra and Rubinstein [1] to design an interdisciplinary course in problem solving.

The Design of the Questionnaires

One hundred technical communicators were selected to participate in this study. They represent industry, government, and academia and were selected in proportion to their membership in the Society for Technical Communication, their regional distribution, and their experience in technical communication.

First a cover letter describing the purpose of the study and the Delphi method was distributed, along with the first questionnaire. Later, additional questionnaires, Q2 and Q3, will be sent to these experts, and their responses will be analyzed statistically. The intention of the experiment is to obtain a list of content topics for the course.

Q1. The first questionnaire asked the technical communicators to list the topics that should be included in a technical communication class for juniors and seniors.

> Technical Communication Questionnaire #1
>
> Problem: What topics do you think should be included in a technical communication class for college juniors and seniors? An example of topics is listed below:
>
> audience
> report formats
> editing
> illustrations
> word processing/text editing
> grammar
>
> Directions: PLEASE LIST UP TO 10 TOPICS. To the right of your list, PLEASE RANK THE ITEMS IN IMPORTANCE FROM 1 (most important) to 10 (least important).
>
> Topics Rank
>
> Do you have any additional thoughts about this subject that you would like to include on the back of this form?

Q2. Once these topics have been determined, I will have the participants place the topics into categories. We will then use Johnson's hierarchical clustering scheme [5] to determine the frequency with which topics are placed into categories which become the content for a course in technical communication. This clustering will then yield categories and topics for our next questionnaire.

Q3. I will provide participants with a list of these categories and topics and ask them to rank the importance of each category and topic.

The Results of the Data So Far

Seventy-six of the 150 technical communicators contacted responded to the first questionnaire. They listed 54 topics, which I reduced to 33 by eliminating the redundancies. Over 50% of the respondents listed the first five topics below, and an additional 6 topics were listed by 20 or more respondents:

Topic	# of Respondents Listing the Topic
audience	62
editing/revising	56
formats/designs	48
word processing/ text editing	47
grammar/usage	45
style	30
project mgt/ planning	23
layout/illus.	23
printing/typesetting	23
organization	23
interview techniques	22

The stage is now set for the second questionnaire. The same participants will be asked to place the 33 topics into no more than 8 categories, which provide a coherent context for teaching the topics in a particular category.

A third questionnaire will ask the respondents to rank the importance of the categories and each topic in the category.

Benefits to the Profession

This research project will advance the goals of the Society in two ways. It is an opportunity to assess the current needs of our field and quantify this assessment into some practical information on what should be included in college courses in technical communication. The project will also bring together the expert opinion of communicators from three sources: government, industry, and academia. Because industries, research centers, and government agencies are requesting people with excellent communication skills, the Society has the opportunity to see that future communicators are well educated in the field of technical communication.

Summary

While the Delphi method is recognized as an acceptable technique for the forming of consensus, the method has never before been applied to the technical communication field. This project will construct the first technical communication course using expert opinion of communicators to design course content. The course model, with its state-of-the-art content, would be of benefit to students and communicators alike.

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Developing Sound Technical Communication Programs for the Future

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The papers following this introduction are presented by directors of technical communication programs from four regions in the United States. They describe the relationship between the Council for Programs in Technical and Scientific Communication and other educational and professional organizations, current projects, and educational requirements for future students.

Since its inception, the Council for Programs in Technical and Scientific Communication has had a close relationship with other professional and educational organizations. Each year, for example, the Council presents a panel at this Conference to keep the membership informed about Council activities, about cooperative ventures between academia and industry, and about educational preparation of students. This year, Council members report on the status of the organization, a specific degree program designed by a university in cooperation with a business, and educational requirements for students involved with information delivery systems in the telecommunication industry.

The first paper, by Virginia Book, Patrick Kelley, and Marilyn Samuels, describes why and how the Council was formed, assesses the success with which it has met its goals, and outlines plans for the future. The Council evolved from a series of informal meetings of directors of technical communication who wished to discuss common interests and concerns. By the late 70's, the group had formally organized and adopted five purposes as their major constitutional goals. The focus, to date, has been on promoting programs, and developing supportive theory and philosophy. In the future, more emphasis will be given to promoting research, to refining communication programs to meet new demands, and to strengthening cooperative efforts between the academic and corporate communities.

The second paper, by David Carson, describes a cooperative program between Rensselaer Polytechnic Institute and Bell Labs in Murray Hill and Short Hills, New Jersey. Three and a half years ago, William Bullock, Lional Howard, and Jane Mitchell of Bell Labs, designed a Master of Science degree in technical communication to meet the special needs of their technical writers. Dr. Carson, a co-designer at RPI, directs the program which will have 40 graduates by the end of August, 1984. Dr. Carson describes the need, design, and the benefits of this unique collaborative effort.

Finally, Victoria Winkler focuses on a specific segment of the telecommunication industry. Because 40% of our population is involved with agricultural interests, Dr. Winkler suggests there needs to be cooperation and collaboration among subject matter, computer, and communication specialists to disseminate information to farmers, homemakers and agribusinesses. Her concern is with educating students as the communication specialists who will play an integral role in developing, producing and evaluating information delivery systems. Dr. Winkler outlines an educational program, part of which is already in operation at the University of Minnesota, for these future specialists.

CPTSC: Developing Sound Technical Communication Programs for the Future

Virginia Alm Book, Patrick M. Kelley, and Marilyn Schauer Samuels

CPTSC

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The Council for Programs in Technical and Scientific Communication (CPTSC) is identified as an organization whose members develop sound technical communication programs for the future. The President, Virginia Alm Book, discusses CPTSC in the past; the Vice President, Patrick M. Kelley, discusses CPTSC at present; and the Treasurer, Marilyn Schauer Samuels, discusses CPTSC in the future. In discussing the past, present, and future, these members of the Executive Committee of CPTSC emphasize the organization's relationships and contributions to the profession of technical communication.

INTRODUCTION

What is the Council for Programs in Technical and Scientific Communication (CPTSC), and what are its relationships and contributions to the profession?

The Council is an organization whose members assess current and future needs in the profession and then contribute to meeting these needs by developing sound technical communication programs for the future. The members are, primarily, chairpersons, directors, and coordinators of programs. As experienced educators and consultants, they are sensitive to the relationships between sound educational preparation and the realities of technical communication in government, business, and industry.

In this paper, we discuss CPTSC--its past, present, and future--with emphasis on its relationships and contributions to the profession.

CPTSC IN THE PAST

In the early 1970's, few technical communication programs existed. Dr. Thomas E. Pearsall of the University of Minnesota realized the potential of a meeting of the leaders of these programs to exchange ideas and information on developing their programs. Thus, in 1973, he invited leaders of programs from twenty institutions to such a meeting.

In the spring of 1974, nine leaders of programs from other institutions, nine professors from the University of Minnesota, and two representatives from the Twin Cities Chapter of the Society for Technical Communication (STC) met in St. Paul. The group's enthusiastic response to this meeting led to a second meeting in 1975 at Boston University.

In 1976, convinced of the value of such meetings, the group formalized its existence by adopting the name Council for Programs in Technical and Scientific Communication. And in 1977, the Council became an officially recognized organization when it adopted a constitution and by-laws.

Thriving since then, the Council now has more than eighty members. They represent technical communication programs at about sixty institutions.

Over the years, the primary purpose of the Council has remained constant: to exchange ideas and information on developing technical communication programs. To improve its network, the Council has published proceedings of its annual meetings and a directory of programs. In 1983, the Council established archives at the University of Minnesota with Dr. Pearsall as the Archivist.

In an effort to establish and maintain productive relationships with both public and private sectors, the Council has invited representatives from government, business, and industry to its meetings on a regular basis. This direct line of communication has kept the Council informed about the needs of government, business, and industry and their representatives informed about the efforts of the Council to meet their needs. Members of the Council have had useful dialogues with these representatives about the Council's contributions to the profession: preparing students for careers in technical communication and helping students in technical and scientific disciplines improve their communication skills.

The past has been devoted primarily to developing technical communication programs. Now, however, as the Council enters its second decade, its members as individuals are reviewing and evaluating the programs that they have developed. Moreover, the Council as a whole is reviewing and evaluating the success with which it is achieving its purposes at present.

CPTSC AT PRESENT

According to its constitution, the Council currently has five purposes:

1. to promote programs in technical and scientific communication;
2. to promote research in technical and scientific communication;
3. To develop opportunities for the exchange of ideas and information concerning programs, research, and career opportunities in technical and scientific communication;
4. to assist in the development of new programs in technical and scientific communication;
5. to promote the exchange of information between the organization and interested parties.

Purpose 1

The first purpose of the Council--to promote programs in technical and scientific communication--has been the primary purpose of the organization during the past ten years.

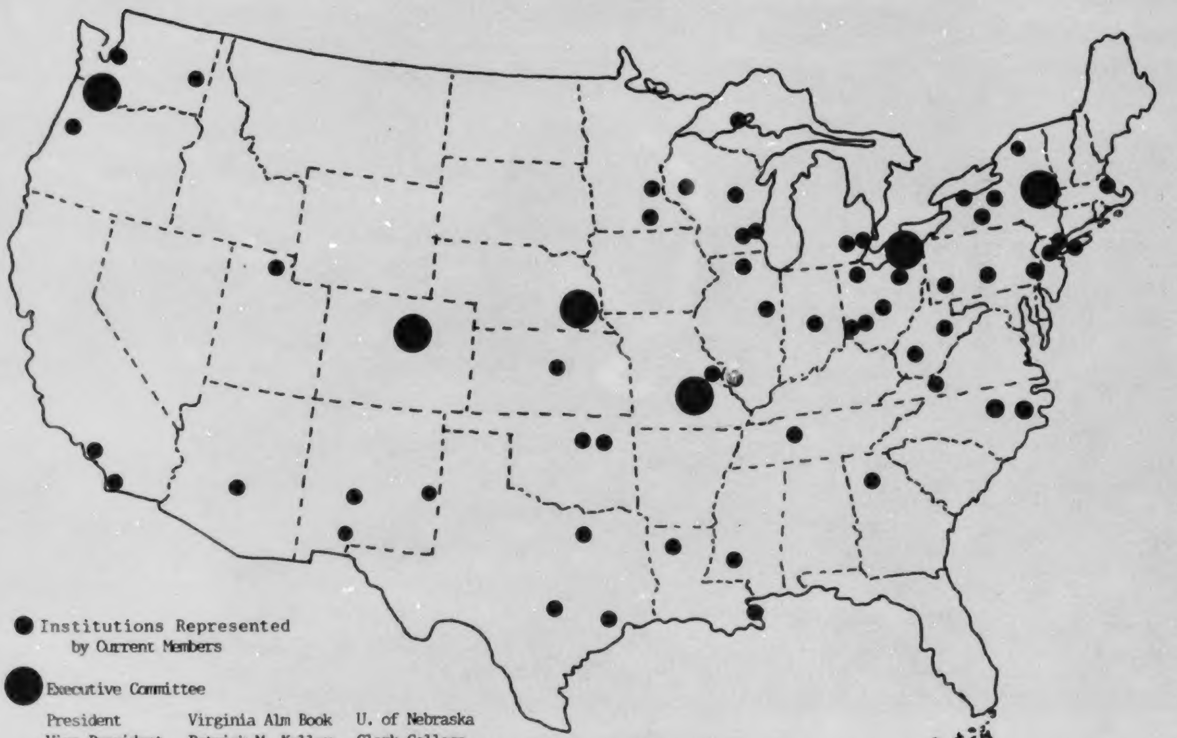
Readers whose memories of the profession extend from 1984 back to 1974 will appreciate the success with which the Council has achieved its purpose of promoting programs. In 1974, Dr. Pearsall was able to invite leaders of programs from only twenty institutions to the first meeting of the Council. In 1984, in contrast, leaders of programs at about sixty institutions are members of the Council. These institutions are located in every region of the nation. (See Figure 1.) The programs include service programs, two-year programs that lead to associate's degrees, four-year programs that lead to bachelor's degrees, and graduate programs that lead to master's degrees.

Purpose 2

The second purpose--to promote research in technical and scientific communication--has not been achieved with the same degree of success as the first purpose. During the past ten years, the energies of the Council as a whole and of most of its members as individuals have been directed more toward creating and developing programs than toward promoting research on which to base the programs.

Members of the Council are pioneers. As practical pioneers, they have directed their energies toward building programs.

Figure 1. Institutions Represented by Current Members of CPTSC, January 1984, and Members of the Executive Committee of CPTSC, 1982-84



President	Virginia Alm Book	U. of Nebraska
Vice President	Patrick M. Kelley	Clark College
Secretary	JoAnn T. Hackos	U. of Colorado-Denver
Treasurer	Marilyn S. Samuels	Case Western Reserve U.
Member-at-Large	Sam C. Geonetta	U. of Missouri-Rolla
Past President	David L. Carson	Rensselaer Polytechnic Institute

This is not to say, however, that the members of the Council have built programs without philosophical and theoretical bases. Their programs always demonstrate implicitly the bases on which they have been built. These bases, though, rarely have been explicit.

Now that so many programs are built, members of the Council are re-directing their energies toward providing explicit philosophical and theoretical bases for their programs. The theme, in fact, for the most recent annual meeting of the Council was "Establishing Practical Applications of Philosophy and Theory for Programs in Technical and Scientific Communication." And in the proceedings of that meeting, *Proceedings 1984 of the Council for Programs in Technical and Scientific Communication*, the bases are explicit.

Purpose 3

The third purpose--to develop opportunities for the exchange of ideas and information concerning programs, research, and career opportunities in technical and scientific communication--has been achieved with success through the annual meetings of the Council, the proceedings, and the directory.

Annual Meetings. The Council has met every year since 1974. It has met at institutions in every region of the nation. (See Figure 2.)

1st	University of Minnesota	St. Paul, MN	1974
2nd	Boston University	Boston, MA	1975
3rd	Colorado State University	Fort Collins, CO	1976
4th	University of Minnesota	St. Paul, MN	1977
5th	Rensselaer Polytechnic Institute	Troy, NY	1978
6th	Oklahoma State University	Stillwater, OK	1979
7th	University of Central Florida	Orlando, FL	1980
8th	University of Washington	Seattle, WA	1981
9th	Carnegie-Mellon University	Pittsburgh, PA	1982
10th	University of Nebraska	Lincoln, NE	1983
11th	New Mexico State University	Santa Fe, NM	1984

Figure 2. Annual Meetings of CPTSC, Sites, and Dates

Like the Council itself, the annual meetings are small. Typically, they include two dozen participants. And typically, these participants include a mix of leaders of established programs, leaders of new programs, potential leaders of potential programs, and professionals, especially from STC. This delightful mix of participants within the small group achieves the purpose of developing opportunites for the exchange of ideas and information.

Proceedings. To achieve the same purpose on a larger scale, the Council also publishes proceedings of the annual meetings. Proceedings are available, in fact, for ten of the eleven annual meetings. These proceedings are compendiums of ideas and information on creating and developing programs in technical and scientific communication. No other resource is more valuable for these purposes.

Unfortunately, many of these proceedings have been as inaccessible as collectors' items. They always have been published in limited numbers. For the most part, they have been available only to members of the Council. A project at present, however, is to place all of the proceedings, as well as other archival materials, on microform in the Educational Resources Information Center (ERIC), where they will be accessible to all.

Directory. In 1978, Dr. Thomas L. Warren edited for the Council a directory, a compilation of the programs in technical and scientific communication. At present, Patrick M. Kelley, Roger E. Masse, and Barbara Y. Myers are updating the directory. Packed with details, the directory from the Council complements the directory from STC. The directory from STC is especially useful for a *student* who wants to know, in general, about the programs that are offered at various institutions as he or she chooses to apply to one or more of them. The directory from the Council, on the other hand, is especially useful for a *teacher* who wants to create a program, develop a program, or evaluate a program and therefore wants to know the particulars of other programs and for an *employer* who wants to know the particulars of the programs that are offered at various institutions as he or she considers hiring their graduates.

Purpose 4

The fourth purpose--to assist in the development of new programs in technical and scientific communication--has been achieved through the directory, the proceedings, and the annual meetings, as well as through personal correspondence and consultation. These are the tangible means to the end of assisting new members of the Council in the development of new programs. At least as important is an intangible: the remarkable professional and personal generosity of the senior members of the Council, the pioneers of programs, who share without recompense their experience and expertise with new members.

Purpose 5

Finally, the fifth purpose of the Council--to promote the exchange of information between the organization and interested parties--is being achieved at present, we hope, with this paper. The Council maintains liaison with STC. Members of the Council present reports on a regular basis at the meetings of other related organizations, including the Association of Teachers of Technical Writing, the Conference on College Composition and Communication, and the National Council of Teachers of English. And members of the Council respond personally to a significant number of inquiries about programs in technical and scientific communication from interested individuals and institutions.

CPTSC IN THE FUTURE

At present, the Council is successful at achieving its purposes. Like any thriving organization, however, it is creating new challenges for itself by virtue of its success.

One challenge for the Council in the future will be to continue to meet the needs of a rapidly increasing membership. As the number of institutions with technical communication programs increases from 20 to 60--or 120--and as the corresponding number of members of the Council increases from 20 to 80--or 160--the organization inevitably will change. The challenge for the Council in the immediate future will be to manage this change. While the organization changes, it should remain the same in the one way that makes it special: it should remain a *high-touch* organization in a *high-tech* profession.

Another challenge for the Council in the future will be to continue to meet the needs of a rapidly expanding and diversifying profession that is changing dramatically because of technology. If the members of the Council are to continue to develop sound technical communication programs for the future, they will have to race to keep up with the changes that technology is creating in the practice of the profession. If their programs are to be sound, they will have to be responsive to these changes.

As educators and managers of education, the members of the Council will have to rely on writers, editors, illustrators, and managers in the profession to keep them informed about the changes that technology is creating. The members of the Council will have to rely on these professionals to keep them informed about state-of-the-art practice in the workplaces of the profession. They will have to rely on these professionals to keep them informed about job descriptions that indicate--or anticipate--trends in the profession.

In other words, the Council's contributions to the profession will depend on its relationships to the profession in general and to the professionals of STC in particular.

To strengthen the Council's relationships to the profession--and thereby to strengthen its contributions to the profession--more of its technical communication programs should have advisory boards that include members of STC. More of the Council's programs should have undergraduate and graduate internships that are established, maintained, and monitored through the cooperation of members of the Council and members of STC. More of the Council's programs should employ members of STC--professionals including writers, editors, illustrators, and managers--as visiting professors. And simultaneously, more of the members of the Council should be employed on a visiting basis as writers, editors, illustrators, and managers.

If the members of the Council are able to continue to develop sound programs that are responsive to changes in the profession, then the members of the profession, in turn, will be able to rely on these programs to provide them with students who are well-prepared to enter the expanding and diversifying profession.

Moreover, the members of the profession will be able to rely on these programs to keep them informed through short courses and summer institutes, for instance, about theory that is changing practice in the profession. For theory is changing practice--sometimes even more dramatically than technology is changing it.

CONCLUSION

This paper is a part of our effort to maintain and strengthen the Council's relationships to the profession in general and to the professionals of STC in particular. STC and CPTSC together, practitioners and theorists together, professionals and educators together: these relationships will contribute to sound technical communication programs for the future. And sound educational programs will contribute, of course, to a sound profession in the future.

ACKNOWLEDGMENTS

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For providing us with Figure 1, which literally puts the Council on the map, we thank Roger E. Masse. •

Training Requirements for Communication Specialists in Agriculture

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Most technical communicators have been placed in the computer, electronics, and manufacturing industries. Two new areas for technical communication are the health related professions and the telecommunications industry. This paper will focus on only one small segment of the telecommunication industry which disseminates extension information to farmers, homemakers and agribusinesses.

The "old family farm" is becoming an electronic cottage. To help the modern farmer solve his problems, manage his business and make decisions, he is relying more and more heavily on the advice of experts and on databases and information storage and retrieval systems. With only 3% of the population involved in production agriculture but nearly 40% of the population involved in agriculturally related areas, the need for accurate information--easily accessible and readily usable--is crucial. To meet the need for such information requires the cooperation and collaboration of subject matter specialists, computer specialists, and communication specialists.

The land grant mission of the College of Agriculture at the University of Minnesota is to disseminate research findings and their implications to farmers and businessmen in the state. In exploring the most cost effective and efficient delivery systems not just for the short term but also for the next decade, telecommunication systems are very attractive. EXTEND, the Extension Educational Network and Database, was established about two years ago in Minnesota. The goals of EXTEND are to provide educational programs (like tutorials and decision-making programs), computing power for home and farm managment, and rapid information flow by connecting county and area extension offices, experiment stations, and the University of Minnesota campuses. This educational network, or EXTEND, consists of a system of microcomputers, terminals and host computers located in county offices, extension offices, and in campus offices of the University. The programs on the system support six major functions: decision-aided instruction, tutorial programs, informational databases, communications, office management, and applied research.

The Problem

At the present time, the technology is ahead of the software. Many more educational tutorials must be developed; databases must be designed and methods of updating them must be put into place; research must be conducted to determine user's needs and to establish priorities for program development schedules; market surveys must be conducted to determine the levels of computer literacy of users. Communication specialists are needed in all of these areas to design the tutorials and databases, to research user's needs, and to evaluate and update tutorials.

The Solution

Communication specialists work with subject matter experts to design, write, test, and evaluate computer-aided instructional tutorials. They work with programmers to design databases, screens, and information mapping techniques. They conduct research on computer literacy and audience needs. And they do most of their composing, editing, project estimating, scheduling and tracking on the computer. When the network allows, they even communicate with one another with electronic mail and with other media sources like AP and UPI.

How does one train students to assume the role of communication specialists? The purpose of this paper is to sketch what I would consider to be an effective program for training future students to provide the databases, office management programs, and word processing needs for farmers, homemakers, and agri-businesses.

GENERAL REQUIREMENTS

If future students are to serve as liaison between the subject matter specialists and the designers and developers of the technology, they need a broad general education that would include four major areas:

(1) Computer literacy
(2) Familiarity with the sciences
(3) A technical area of specialization
(4) Social science and humanities courses

To develop computer literacy, these students should have at least one course in the following areas:

1. Computer Language
2. Hardware
3. Management Information Systems
4. Word Processing/Office Management Systems

At least four courses in the laboratory sciences would also be necessary to foster an understanding of the concepts of science. In these courses, the students should become familiar with scientific terminology; they should learn how the various scientific disciplines are organized and how professionls in those disciplines identify, define, and solve problems. They should also study the sciences in enough depth to identify the major issues that are being debated in the sciences and to look for connections between disciplines.

Based on their interests and abilities, students should be encouraged to specialize in a technical area which would give them depth and a sound working knowledge of a discipline. A minimum of five courses in the technical area of specialization should be required with at least two of those courses at the upper division level. This area of specialization might be composed of a single disciplinary area, or it might consist of a number of related courses covering a variety of disciplines which would give students familiarity with what professionals do in specific business, industrial, research, private, or governmental sectors. For example, students who will be working in computer assisted instructional programs for the telecommunication industry might select courses from curriculum design, cognitive psychology, learning theory, systems theory, and graphic design.

The focus in these general education requirements should be on teaching students the concepts of science, problem-solving skills, and how to use information gathering and processing tools. They should be taught systematic procedures for exploring a discipline, gaining familiarity with its terminology and basic concepts, and learning what resources are available to them in that discipline and how to access them. All of these skills should be transferable. In other words, students should be taught to master bodies of knowledge quickly so that they can work cooperatively and efficiently with subject matter experts. Moreover, the study of the relationships and correlations between the disciplines should be stressed so that students learn to move comfortably and converse intelligently in the areas of science and technology.

Their problem-solving skills in analysis and synthesis should be supplemented and enhanced by courses in the social sciences and the humanities, which give them a sense of the cultural and societal contexts in which these forces operate. The social sciences and humanities also provide a broader perspective and a more balanced view enabling students to fit scientific and technical knowledge into a human and societal context. What must be stressed here is that science and technology are designed to meet individual's and societal needs and must be evaluated in terms of how effectively and efficiently they meet those needs. This kind of evaluation cannot be made in a value free context, so the question of technology assessment and values clarification should be raised in the humanities and social sciences.

PROFESSIONAL COURSES

If these students are being prepared to assume the role of professional communicators, they should gain competence in five communication areas:

1. Writing and editing
2. Oral communication
3. Visual communication
4. Organizational communication
5. Communication theory and research

In their writing and editing courses, the students should study the entire composing process from prewriting through editing. The prewriting process includes the thinking and planning stages. Students must learn to identify communication problems in their organizational contexts, to gather information, to analyze their audiences, to determine and state their purposes in writing, to design effective communication strategies, and to select the proper channels to carry their messages. They must become familiar with the forms of informative and persuasive discourse and learn to manipulate inventional and structural writing models to meet their audiences' needs. They would also need specialized writing courses to teach them how to write documentation, scripts, newsletters, proposals, etc. A sampling of the kinds of writing courses that would meet these needs would include:

- Scientific and Technical Writing
- Writing for Publication
- Professional and Business Writing
- Publications Editing
- Writing for Special Purposes:
    - Manual Writing
    - Grant and Proposal Writing
    - Newsletters
- Electronic Text Editing

(These course lists are not all inclusive; they are meant to serve as examples of the kinds of courses that would provide skills training.)

In their oral communication courses, the students should strive for a balance between formal public speaking skills and interpersonal and/or small group discussion skills. Not only should they be taught formal presentational skills and how to rework the same information for experts in related fields and lay audiences, they should also be taught informational interviewing skills so that they can gather information efficiently, effectively, and accurately from subject matter specialists. Likewise, they need proficiency in conferencing and conducting meetings to allow for participation, direction, negotiation, compromise, and building a cooperative rather than an adversarial working environment. In developing models for working with subject matter specialists and the designers and developers of technology, the communication specialist must become an advocate of the user. This means that he/she must assist the specialists and technologists in designing systems that truly meet user's needs. Some of the oral communication courses that might be required would include:

- Scientific and Technical Presentations
- Interviewing: The Dynamics of Face-to-Face Communication
- Small Group Communication
- The Process of Persuasion
- Discussion Methods
- Introduction to Broadcasting
- Advanced Public Speaking
- Effective Listening

Visual communication is the third competency area that students should develop. In addition to learning the principles of layout, design and typography, the students should also be trained in technical drawing and computer graphics. They should learn basic design principles that would aid them in every aspect of graphic presentation from print media to video. They should also learn to apply these principles to solve screen design problems thereby minimizing information overload. Finally, they should be taught to evaluate different media in terms of their visual impact and visual potential. The types of courses that students could elect in visual communication might include:

Basic Typography
Color, Design
Visual Presentation
Two-Dimensional Design
Scientific and Technical Graphics
Introduction to Commercial Art
Technical Drawing
Functional Photography

Competence in organizational communication will help students to understand and make use of the communication channels in any organization. They should learn about theories of management, about leadership in organizations, and about strategies for conflict resolution. They should learn what motivates people and how to mobilize them to achieve organizational goals. They should also become aware of power and authority in task-oriented organizations and how to identify and coordinate human resources from all over the organization. Moreover, they should learn how to be effective politically in their work environments. The kinds of courses which would teach them these organizational communication skills might include:

Direction of Training in Business and Service Organizations
Studies in Organizational Communication
Conflict and Change
Managerial Communication
Dissemination and Utilization of Information
Transfer of Technology
Leadership Communication

Finally, in the area of communication theory and research, the students should be familiar with rhetorical theory, communication theory, and systems theory. They should be given a problem-solving orientation which stresses identifying problems, assessing needs, designing creative solutions to problems and generating principles that have wider applications. Although some of their research will be in theory-building, much of it will be applied. They would be involved not only in designing and conducting controlled experiments, but also in designing effective evaluation procedures and delivery systems. The kinds of courses that could give them strong theoretical and research backgrounds would include:

Principles of Human Communication
Rhetorical Theory
Research in Communication Strategies
Theory Construction and Analysis in Communication
Quantitative Research in Communication
Research in Electronic Text Processing and Publication

An integrated approach to studying communication which provides students with a healthy mix of theory and practice is essential to prepare them to solve open-ended problems in organizations. At the undergraduate level, these courses should be practical and production- oriented. At the graduate level, they should be more theoretical to develop models and principles which would have much broader and interdisciplinary scope and application.

An essential part of any such program is a laboratory to do some reality testing. Required internship experiences in business, government, industry, research or service organizations could serve as such laboratories.

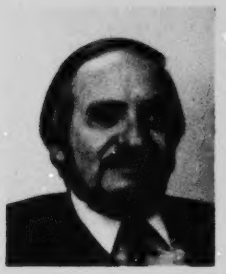
SYNOPSIS

The mix of communication skills that I have outlined would produce the caliber of communication specialists required to play an integral role in the design, development, production, documentation, evaluation, and dissemination of information and information delivery systems, not just in agricultural areas, but in any major industry.

The program I have described for training professional communicators was established in 1971 by Dr. Thomas E. Pearsall in the Rhetoric Department in the College of Agriculture at the University of Minnesota. Originally the program had two students. Currently, the program has 112 undergraduate and 31 Masters students. It has been placing graduates in a wide variety of communication positions across the country. The average starting salary of the most recent graduates is $22,000. This program has served as the model for many of the 30 other programs in scientific, technical and professional communication that are springing up across the country. For more information about the programs in Technical Communication, write to Dr. Victoria M. Winkler, Department of Rhetoric, 202 Haecker Hall, University of Minnesota, St. Paul, MN 55108.

Visual Communication Stem

J.F. 'Cal' Callahan, Stem manager; Mike Plinke, Deputy Stem Manager



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Whether we like it or not, today's technology demands that the technical communicator apply multidisciplinary skills and master strange new devices. It seemed appropriate, therefore, that The 1984 Visual Communications Stem focus on "The Technological Revolution in Visual Communications" -- the title of its keynote panel. Eight of its 18 sessions offer different perspectives on topics ranging from digitized typography to video programs, including a hands-on look at computer graphics.

New technology and new approaches to established visual communication techniques add interest to other offerings within the stem. These include:

- a workshop on using any 35-mm camera to create "instant" slides and prints up to 8 by 10 inches;
- introduction of a new technical communications discipline, the presentationist, that should open up new opportunities for creativity and employment in the field;
- an all-morning panel on the multidisciplinary challenges of producing a technical exhibit booth or display.

The Visual Communications Stem features a mix of proven performers returning with updated versions of past winners and new faces with fresh viewpoints on topics new and old. Marty Shelton offers his latest collection of film clips and comments; Pat Caernarvon-Smith again presents her well-received workshop, "Page Design for Writers and Editors"; Bill Horton and Herb Vogt have reworked their papers (on "the four-dimensional page" and "wordless instructions", respectively) into workshops with stronger "how-to" emphasis, and last year's best paper presenter, Kathy Dolberg, will participate in both the keynote panel and the technical exhibits panel.

The latter panel and Larry Gottlieb's Wednesday afternoon panel, "New Approaches to Audiovisual Presentations", are of particular interest because they touch on areas once considered outside the mainstream of the technical communications discipline.

Of the 18 sessions offered, 3 are multi-paper panels; 1 is a role-playing panel, 8 are workshops, and 6 are single-paper presentations. Where space or subject matter limits the number of participants, as is the case with the video presentation and computer graphics workshops, repeats are scheduled. Also on view in conjunction with the Visual Communications Stem will be the 1984 winners in the Audiovisual Competition. These will be screened continuously all day Monday and Tuesday.

Sounding the future in technical communications makes it clear that every traditional discipline will need broader, deeper knowledge of visual communications. Our stem presentations offered this year -- because of their variety, excellence and focus on emerging trends -- can enhance both your comprehension and utilization of visual communications technology.

The Technological Revolution in Visual Communications

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ABSTRACT

This panel will consist of three brief talks previewing the impact of technology on people and processes in visual communications: the changing role of the artist or designer; and applications of new technology in technical communication.

Paul Arthur, of Newton Frank Arthur Grohne Inc., considers the future of design—without designers. He presents his view that technological change in the print media is rendering the designer ofsolete, at least by current definition of designer. Mr. Arthur goes on to describe a new role for the designer of the 80's: transferring his creativity to nondesigners for their use.

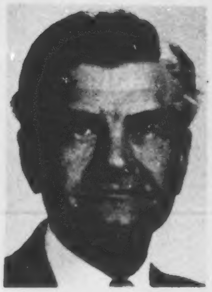
Kathleen M. Dolberg, of Los Alamos National Laboratory, describes her vision of the perfect computer graphics system. Since a new system which comes close to her vision has just been introduced at Los Alamos, Ms. Dolberg's talk centers on that system which, she says, "offers the hardware and software needed by a graphic artist at a reasonable price".

Jim O'Neal, of Purdue University, discusses the changing role of the visual communicator in terms of the education and experience needed in today's work force. Mr. O'Neal's focus is an on-going study being conducted by Purdue's Technical Illustration Technology program. He describes the completed first phase and the current Delphi method second phase.

These three panelists present different views on what the technological revolution in visual communications is and how visual communicators can grow and adjust with the revolution.

The Influence of the Information Film

S. Martin Shelton



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Information film is a mass communication tool used to manipulate human behavior. Specifically, information film is designed to communicate messages to large audiences so that they will act or think in a manner that accomplishes the objectives established for the film; that is, what to do or think, how to do it, or why to do it. Information film is not inherently persuasive, however. Its effectiveness is influenced by several controlling factors that the film designer should recognize and manage. Within the context of this paper, "film" includes all forms of kinetic audiovisuals such as film, video (broadcast, tape, and disk), and slide/tape programs.

MEANING OF COMMUNICATION

According to classical definition, information film is a communication medium. But what kind is it? How does it do its job, and why does it work? Perhaps a slight digression from our main theme is in order to set a perspective—to establish the communication ground rules, as it were. Communication—the buzz word in today's hyperkinetic information society—has many definitions. All are valid. Verity is affirmed (or not) by the individual from his or her unique viewpoint.

In the mid-40s, Claude E. Shannon of the Bell Telephone Laboratories defined communication in precise mathematical terms (1). His primary concern was to determine the information capacity and error rates of discrete electronic circuits (2). Communication defined in this context is the encoding of information into electronic signals or messages, transmitting and receiving the messages, and decoding the messages back into information that is error free or nearly so. In broad terms Shannon's definition is also valid for any general communication system. Importantly, the ideal communication system has provisions for real-time feedback.

Though applicable in an abstract sense to general communication systems, Shannon's mathematical theory of communication fails to provide a definition in societal terms. And communication is primarily a social phenomenon since it involves interaction between humans.

In its simplest sociological form, communication is the process by which a person influences the behavior, opinion, or knowledge of another (3). Gordon says communication is ". . . the basic way in which experience is mediated between individuals . . ." (4).

Over the years, man has devised a host of processes (or ways) to communicate—all of which embody various forms of physiological and mechanical dynamics. Some of these processes have evolved into complex technical systems—nowadays dubbed media.

THOUGHTS ON MEDIA

Today we are surrounded by media—some say we're blitzed. Key notes that ". . . the communication media assaults our senses during many hours of the day . . . the media has a specific ability to manage, control, and manipulate human behavior . . ." (5).

But just what is this omnipotent force? Perhaps intuitively we all know what the media are and what they're all about—or do we? Defining media in fundamental terms is significantly more complex than would appear at first thought. In essence, a medium is the means or vehicle that engenders communication—a conduit for messages. Though perfectly valid, this definition of medium does not address the fundamentals in humanistic terms or pinpoint the primary media.

From a physiological perspective, a medium is an entity that triggers a sense modality through stimulation of sensory nerve endings. Composed of specialized cells and tissue, nerves encode the messages into electrical or chemical signals. Neurons transmit the signals to the brain where they are decoded into information. And, if all is in order, the human receptor reacts to the communicated information in an "appropriate way." Should the communication be persuasive, as much of the mass media are intended to be, "appropriate way" means in a manner necessary to accomplish the goals set for the communication.

Thus, medium is a conduit and a stimulant. Though having distinct functions, these two critical attributes are so clearly entwined that they are inseparable, and they form the basis of all media. Also, media are either active—light or sound waves, or are passive—texture that the receptor must touch to sense.

I suggest, therefore, that there are only five primary media.

Active media are

Light—stimulates the visual sense.
Sound—stimulates the aural sense.
Odor—stimulates the olfactory sense.

Passive media are

Flavor—stimulates the gustatory sense.
Senture*—stimulates the tactile sense.

All other communication tools (media) are applications, either singular or in combination, of these five primary media—usually refined to some degree. (Some might contend that there is a sixth primary medium—that ethereal "substance" that stimulates extrasensory perception. However, I'm not convinced.)

Fully realizing that my thesis on primary media is contrary to contemporary notions of what media are, some discussion of the basic premise is in order. Today a medium can be just about anything from which a human receiver gets messages—newspapers, speech, film, radio, a whiff of perfume, or a touch of silk. On an operational level, this notion of media is eminently practical, and I accept it.

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* Since there is no comparable noun in our language that parallels the other four I've used to describe the primary media, I've coined "senture" to fill the void. Senture is a composite of the words "sensation" and "texture," and it has the flavor of "centaur"—a mythical creature noted for hedonistic gratification of the tactile sense.

However, within the context of the basic premise that there are only five primary media and that each is a conduit and a stimulant, most of what we call media are really something else. For example, writing and drawing are visual designs that express thought, and they are the messages. Newspapers and billboards distribute the messages. But it is only the reflected light from the page that is the primary communication medium—light conducts the encoded messages and stimulates the eye.

Similarly, the primary medium for voice and music is sound. Records, tapes, and radio are the means for distribution. One could argue, correctly, that it is the air that transmits the sound waves. True enough. But air, *per se*, lacks the critical attribute of being a stimulant. That is, it is the sound, a series of pressure waves traveling through the air, or some other material, that affects the ear drums. The same rationale applies to all five primary media, though for the passive media the issue is less clear-cut.

Odor, frequently coupled with other media, is a vitally effective communication medium. Some examples are the waft of a sizzling steak, a delicate rose, acrid smoke, and pheromones—secreted hormonal substances that serve as sexual communication.

Flavor and senture, which have no kinetic properties, implement communication only when substances having their properties come into contact with appropriate sensory organs. As with odor, flavor and senture are almost always operative in conjunction with other media.

Of particular import is that a number of researchers have shown that such multisensory stimulation is synergistic—causing intense reinforcement of communication (6). The combination of light and sound has proven to be a particularly potent mixture. One prime example of such multisensory stimulation is film in all its varied forms.

FILM'S INFLUENCE

Information film *is* a complex hybrid communication medium whose messages are encoded through sophisticated engineering and psychological processes into the primary media of light and sound. When information film is produced with the "proper" mix of tone, content, and structure to meet specific needs of target audiences, its messages exert powerful influences. That is, by skillful application of film's inherent physical, artistic, and psychological characteristics, a potent synergism is formed that evokes an empathic reaction in target audiences. Such audiences experience intense intellectual and emotional involvement which, on the whole, engenders communication—thus, realizing film goals (7).

Some of the broad-based communication goals set for information film are to train, sell, motivate, inform, orient, indoctrinate, teach, and propagandize (8)—film may even entertain, from time to time. Entertainment, *per se*, however, should not be a primary goal nor should entertainment be the underlying basis or style of information film. Significantly, in some instances, the influence of a particularly effective information film will persist for many years (9).

Curiously, in the early days of cinema, film's potential for influencing mass audiences was largely unrecognized. Perhaps it was John Grierson, founder of the documentary film movement, who first realized film's persuasive power—the intrusion of ideas and emotions into a person's psyche either overtly or subliminally. Grierson thought of film as a form of publication. In 1935 he said, "Cinema is neither an art nor an entertainment, it is a form of publication, and may publish in a hundred different ways for a hundred different audiences. There is education to serve . . . [however] the most important field is propaganda." (10) If we may define "propaganda" to mean marketing, his perceptions were uncanny. Note the surfeit of highly effective television commercials that hawk everything from Army enlistments to Zinfandel wine.

Of all the characteristics that contribute to the persuasive influence of information film, I see the following as the more important. (The reader is directed to my paper "Do You Need A Film?" for a detailed discussion of these characteristics (11)).

- Messages are preprocessed to the bent of the film designer or sponsor.
- Audiences are captive in many screening environments—having their attention concentrated only on the screen.
- Remote locations and abstract concepts are visualized.
- Time is manipulated through the plasticity of the medium.
- Messages are sent simultaneously in two primary media—light and sound. Film is multimedia.

In well-produced information films, these collectively augmenting characteristics are harmoniously blended to effect optimum communication—making film's influence compelling.

Dual-Sense Modality

It is impossible to assign a specific communication value to any of the characteristics because functionally they are closely interrelated and totally interdependent. Of singular importance, however, is film's multimedia characteristic. It is through this dual-sense modality that film's messages are transmitted in a highly potent combination. At the receiving end, the mutually reinforcing messages stimulate in concert the visual and aural senses. This powerful double-barreled combination of dual-sense stimulation contributes in large measure to the compelling influence of information film.

Technical Progress

Over the years there have been major advances in film technology that have intensified and broadened sense stimulation. Thus, communication is increased (supposedly). In some applications, such as commercial cinema, communication and entertainment *may* mean the same thing (12). Some may not recall that talkies didn't become the universal standard it is today until 1930. It was in 1928 that the Warner brothers produced the first *all* talking motion picture, *Lights of New York* (13).

Various wide-screen photographic and projection techniques expand the area of visual stimulation to include peripheral vision and more. One such technique is CinemaScope. Twentieth Century-Fox produced the first CinemaScope motion picture in 1953, *The Robe*. A host of other wide-screen techniques soon followed; for example, Cinerama, Todd-AO, VistaVision, Panavision 70, and Omnimax.

Another attempt at expanding visual stimulation was 3-D cinema or stereoscopic cinema. Though the 3-D process had been in use for a number of years (stereopticons, for example), it was not until 1952 that the first 3-D theatrical motion picture was produced, *Bwana Devil*. In the next few years other 3-D motion pictures were released, such as *House of Wax*. No boom in 3-D ever materialized because audiences were apathetic. Despite several recent attempts at revival, 3-D cinema is a commercial failure.

Recently, I've seen several short film clips of holographic cinema. In these experimental clips the stereoscopic effect is excellent and is seen without use of special glasses. I suspect holographic cinema may well be the future standard.

Several 3-D video processes have been patented within the past few years. Still in the developmental stages, these 3-D video processes offer promise for commercial applications—medicine and engineering, for example.

Early sound was recorded optically on the film. Results were poor. Recording on magnetic tape was the technological breakthrough to the realization of full spectrum sound, and was in full use by 1950. High-fidelity and stereophonic sound (and even quadraphonic sound) markedly heightens aural stimulation. In 1972 Dolby sound was introduced—a super high-fidelity process that eliminates tape hiss and adds clarity.

So far, the technologies discussed are centered on enhancing the stimulation of film's primary media—light and sound. In the recent past, several attempts were made to include a third primary medium in film's sense modality—providing a nearly all-encompassing sensory environment. I know of no attempt to exceed three sensory modalities in one motion picture. However, as technologies are perfected, I'd expect that film will be quinquemodal sometime in the future.

Significantly, no additional primary medium was incorporated into the physical form of the film. Rather, the added sensory stimulation was provided by various devices installed in the theaters. These devices were triggered in synchronization with picture and sound.

Odor for olfactory stimulation was added by several processes in the late 1950s and early 1960s. All were without commercial or aesthetic success, and without longevity. In 1959 it was AromaRama for the documentary film *Behind the Great Wall*. Smell-O-Vision was it in 1960 for Mike Todd, Jr.'s motion picture *Scent of Mystery*. Finally, *Pink Flamingos* was released in Odorama.

Sensurround is the process that augments senture to film. Released in 1974, *Earthquake* was the first motion picture that affected tactile stimulation. Rocking devices under theater seats caused them to sway in synchronization with earthquake scenes on the screen. Other motion pictures released with Sensurround are *Midway* and *Rollercoaster* (14). Not much has been seen of, heard of, or felt from Sensurround since 1977.

When viewing motion pictures produced in some of the super wide-screen processes (Cinerama and Omnimax, for example), one can experience very real motion even though no senture is incorporated into the process or in the theater. Adding to the sensory environment is booming stereophonic sound. The audience is surrounded by a dual modality that is vivid, dynamic, and unavoidable. In such a captive milieu, audience members experience intense sensory stimulation causing a near total empathic projection into the motion picture. In response to camera moves that produce a tilting horizon and odd perspectives of the natural environment, and with "earthly" reference points minimal, a person reflexively shifts body position to maintain orientation and balance. One can even "feel" such camera movements in the "pit of the stomach." Though this involuntary phenomenon is not directly related to senture, it is closely akin because the audience member moves in response to filmic stimulation and experiences some tactile sensations.

A partial explanation of this phenomenon is found in Charles Hoban's discussion of the principle of "sensory complementation." (15) To make a more complete sensory experience, sensations from one primary medium are augmented by sensations from other senses that have not been stimulated. For example, people feel what they see, taste what they smell, and see what they hear.

No attempt to incorporate flavor in film has been documented. However, with the motion picture industry being what it is, I'd be surprised if it were not tried.

For the record, it is noted that all the names of the processes discussed here are trademarks.

Some of the techniques and processes were gimmicks and short-lived. Others remain as today's cinema staples—and are the foundations of newly emerging technologies. By adding technical excellence and expanding sensory stimulation, these techniques and processes have made motion pictures much more enjoyable and entertaining, generally speaking. I suspect, however, that these techniques and processes probably do not significantly enhance communication, especially in the long term.

My last statement ought to be tempered with the reality that only a few of these techniques and processes are used in information film—where persuasive communication is paramount instead of entertainment and entrepreneurship. By and large, their cost and logistics cannot be justified when clinically compared to expected *added* results.

Communication is engendered not by technology, but by accomplished use of technology, by skillful application of film's inherent characteristics, and by professional manipulation of those variable factors that affect film's influence.

FACTORS AFFECTING INFLUENCE

The variable factors that affect the influence of information film are many and varied. And in various combinations and intensities they are uniquely applicable to each individual information film.

Within my experience, I've identified six major, variable factors that apply to all information film.

Motivation

The audience must be motivated for communication to occur. One has to be convinced it's to his/her advantage to be in the screening environment and to pay attention.

Credibility

If a persuasive information film is to be successful, the audience must hold the film designer and the sponsor and the medium itself in high esteem in terms of credibility and prestige. It matters not whether the messages are true. What matters is whether the audience believes the messages to be true and accepts them in the context presented (16).

Audience Profile

Audiences come in all sizes and compositions. Individual temperament, background, understanding, and values are singularly diverse (17). Yet, if we are to communicate effectively with the target audience we must know who it is. That is, what is the audience's composition—its audience profile.

Optimum communication is ensured when the messages are couched in a tone and a *mise-en-scene* that is familiar, relevant, and sympathetic to the audience. Such messages engender understanding, acceptance, involvement, and empathy.

Film Content

Over the years, I've found the following points on film content to be generally applicable to all information film. I recognize that exceptions exist for special applications.

- Keep the messages short and to the point. Too many details cause a mental "short circuit."

- Be leary of cute gimmicks. They can backfire and become noise that obscures the primary message.

- Most messages should be visual. Information film is a visual medium in a visual age. Approximately 70% of the effect of information film comes from its pictorial content.

- Auditory messages must be secondary—used sparingly only to reinforce the visuals.

Film Structure

Of critical import is how information film is structured—how the messages are dosed out. The following abbreviated list contains ideas on film structure I've found particularly useful.

- Anticipation heightens audience awareness for a coming event.

- Requirements tell the audience what's expected from them after the screening and explains why.

- Repetition is more than a simple duplicative iteration—it is the varied presentation of the major points, concepts, and meanings.

- Development rate is the pace at which the information film unfolds. The optimum rate is one that allows the audience time to assimilate the new information or concepts and allows time for reflection.

- Participation is overt sharing in the communication process—exemplified by interactive video disks or by built-in questions and answers.

- Dramatic structure can generate empathy if the audience can identify with the elements of background, characters, and plot.

- Subjective camera is that camera angle that shows the action from the eye position of the audience.

- Summation reviews key points and presents a cohesive survey of their relevance.

Communication Surround

The physical environment in which the film is seen is a critical factor in the communication process. Some elements of communication surround are room size, appointments, acoustics, lighting, audiovisual equipment, power, and noise. Other elements are frequency of exposure to the film, supporting material, and the qualifications of personnel that operate the equipment and lead and monitor the audience.

CONCLUSION

One of film's inherent characteristics is that identical messages are transmitted to every person in the audience. Importantly, as we've seen, not all members of the audience receive the same message; that is, the film's messages influence each person differently. And that influence may be significantly different from that intended. Part of the problem lies in the fact that messages in the film medium are couched in an emotional and aesthetic bent based on the film designer's or sponsor's value judgments. If such judgments do not match the audience's, film's influence is skewed. In successful information film, those characteristics and factors that influence effectiveness are exploited to maximum advantage—facilitating communication to realize film's goals.

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Computer Graphics: Applications and Capabilities

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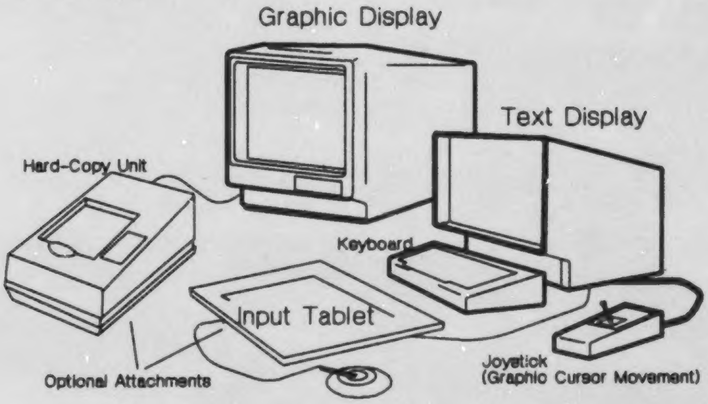
The in-house publishing shops are on the threshold of a new and exciting environment: automated graphics.

Automated graphics means creating graphics with the aid of an old friend, the computer. Technology has finally advanced to the level that illustrators, draftsmen, designers, and even users not trained in graphics can use computer graphics programs. The programs have become "friendly" with "help" facilities, menus, prompts, and other forms of online assistance. Following is an example of a typical automated graphics workstation. It is made up of a command entry text terminal which also displays the online assistance, a graphic storage tube which displays the graphic, graphic cursor controls (joystick and input tablet), and a hard-copy unit for getting a review copy of what is displayed on the graphic storage tube.



Typical Graphic Workstation

THE USERS

Graphics program users include artist/illustrators, editorial assistants, and writers.

- Artist/illustrator

  Obviously the artist/illustrator profits the most. The traditional methods of illustration are now being replaced by program functions and sophisticated output devices. The pens, templates, tape, and knives are now menu options or commands that provide the same results. The photostat cameras used to enlarge or reduce and to clean up patched artwork have become program functions. Any manual tasks used to create graphics of a specified size or orientation can now be achieved using the terminal.

- Editorial Assistant

  The role of the editorial assistant or text entry person is ever growing. Tools for text entry are more sophisticated as well. Entry devices, such as typesetters and small-storage magnetic card typewriters, are being replaced by computer terminals connected to large host systems providing mass storage and elaborate text editing and formatting programs. The graphics terminals enable the editorial asistant to create artwork, such as tables and charts, and to preview images prior to printing camera-ready copy. Even interactive formatting is possible on the graphics terminal display.

  Automated graphics encourage editorial assistants to work closely with artists. Graphics programs allow text and graphics to be merged and printed on the repro printer. The sharing of information between the artist and editorial assistant for sizing and naming conventions of the graphics is essential. The artist creates the art and provides a soft-copy file for the editorial assistant to merge with the text.

- The Writer

  By wisely using the functions provided by the graphics programs, the writer can control each graphic's message. Placement and relative sizes of the objects in a graphic can usually be best determined by the writer. He has the technical knowledge of what the product designer or developer wants to get across to the customer. Free movement of graphic elements on the display provides this placement ability. By using the talents of the illustrator, the writer accesses graphic libraries of pre-drawn objects to use within his art. Line quality and style are computer-controlled to ensure quality.

THE AUTOMATED GRAPHICS SYSTEM

The system consists of a host, a terminal, and a repro printer.

- The Host

  Obviously, you cannot automate your publishing without a computer. Within the computer are the graphic program files, and storage. The programs are graphic editors in addition to processing and output tools. The files contain the data that is interpreted by the computer and represented on the display as lines, shapes, and text. The storage is the space used by the computer to contain the graphic programs and files.

- The Graphics Terminal

  At the end of a cable connected to the host computer, is the terminal: the replacement for familiar aids such as pencils, pens, templates, scissors, and tape. The high-resolution graphics terminal is more sophisticated than the normal data-entry terminal. Jobs done on a graphics terminal require art types ranging from simple charts to orthographic drawings (engineering type) and even perspective views.

  Lines on the display screen are produced by program functions that require two points, which you define. By manipulating the graphic cursor and filling between those points, you create a line. This line can be in any direction. It can be any length, style (solid, dotted, dashed, and combinations), and any thickness. You can place arrow heads and tails automatically. You can even make rounded corners.

  Shapes you can create include circles, blocks (boxes), and a variety of graphic objects. An ellipse is achieved by distorting the circle. Boxes can be defined as squares, rectangles, and other polygons. Other shapes include flow chart, electrical, or architectural symbols, and a long list of pre-drawn machines, people, and animals.

  Menus aid the user in creating graphics. The menu options generally explain the functions in familiar terms. Good menus follow a logical path through the creation or editing of a piece of art.

  The respresentation of the graphic images on the screen should exactly duplicate the image that is printed on the repro printer. A "What you see is what you get" approach to the display is most desirable.

- The Repro Printer

  A high-resolution printer is essential for getting camera-ready masters. The printer pel (dots per inch) rate must be high enough to produce smooth lines and characters. The printer must have the capability to print both text and graphics. By having this capability, what you achieve is text and graphics merged on the same page. An obvious benefit is the saving of time and money required for manually performing the same task. You can not justify installing a graphics system on pretty pictures alone.

ADVANTAGES OF AN AUTOMATED GRAPHICS SYSTEM

Any competent illustrator is capable of providing high-quality line art. Special education, tools, skills, and experience have taught this person how to best utilize graphic tools to achieve those magnificent renderings.

Sometimes, the illustrator becomes a support person for too many writers. Often, the illustrator cannot adequately provide all the artwork needed. Just to give each writer their copy of art requires time at a photostat device, which takes time away from the task of drawing. By having access to the graphics programs and files, the illustrator can create camera-ready art and get review copies from a conveniently attached hard-copy unit.

Another advantage for the illustratior is updating artwork. Ask any illustrator how many times a piece of art has been created that was never changed. The initial creation of the automated artwork may not be faster than traditional methods of producing artwork, but the updating is. Editing functions in the graphics programs allow you to erase, clip, copy, and move objects on the graphic display. Zooming functions allow for detail work; scaling functions re-size the artwork. Doing these same tasks manually is very time consuming.

Once graphic files are created, the files can be transmitted over telecommunications lines between hosts or between sites. Joint-effort writing involving different locations is easily accomplished.

Also, files can be transmitted to a printing shop where they can be printed on the same output device used in the local in-house publishing shop. This reduces manually handling repro masters which saves time.

THE FUTURE

What is in the future for computer graphics? Who really knows? We can look forward to color editing on color displays, repro masters that double as offset plates, and more sophisticated programs providing virtually unlimited functions and abilities. Low-cost input devices, such as terminals and scanners, will advance the cause at an accelerated pace. Any member of the in-house publishing community can have an active part in this exciting field.

The Four-Dimensional Page: A Workshop in Visual Creativity

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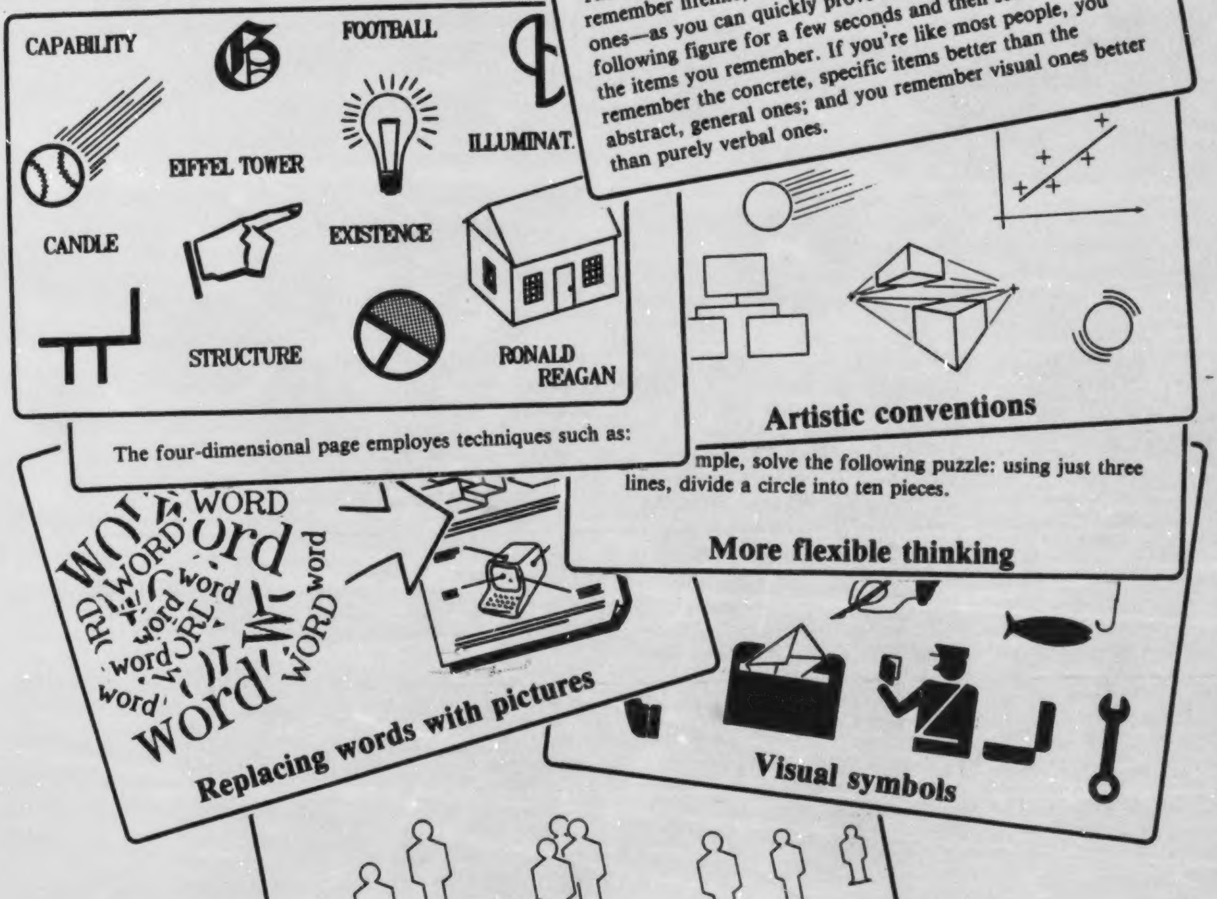
We live amid a wealth of sensual experience. It is our birthright from a billion years of evolutionary heritage. But many technical documents deny us our due. Too often they are composed of little more than monotonous black lines of text on a white background. As an antidote for this sensory deprivation, try a dose of the *four-dimensional page*.

The four-dimensional page relies on the principle that we remember lifelike, sensual images better than abstract, verbal ones—as you can quickly prove to yourself. Look at the following figure for a few seconds and then see how many of the items you remember. If you're like most people, you remember the concrete, specific items better than the abstract, general ones; and you remember visual ones better than purely verbal ones.


CAPABILITY
FOOTBALL
ILLUMINAT.
EIFFEL TOWER
CANDLE
EXISTENCE
STRUCTURE
RONALD REAGAN
Artistic conventions
More flexible thinking
WORD
word
Replacing words with pictures
Visual symbols
Monocular cues

The four-dimensional page employes techniques such as:

mple, solve the following puzzle: using just three lines, divide a circle into ten pieces.

Computer Graphics in a Writer's World
Seeing Through the Hooplah

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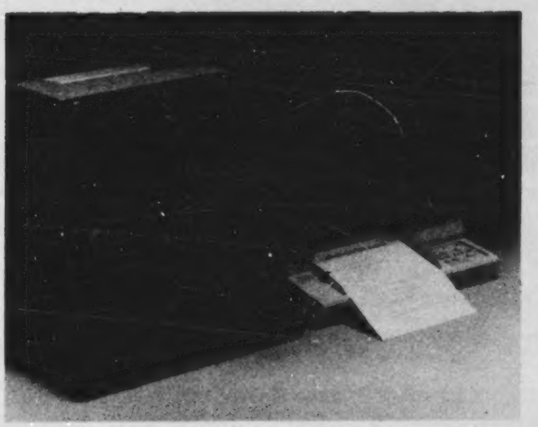
This presentation is designed to help you see through the hooplah concerning computer graphics. The state-of-the-art in business graphics software and hardware is discussed. The difference between hardcopy versus video graphics applications are explained — in terms of what we've learned here in our technical writing group.

BACKGROUND

To really appreciate the use of computer graphics for documentation or business use, it is important to understand a little of its background and history. Computer graphics involves the input, construction, storage, retrieval, manipulation, alteration, and analysis of pictorial data. Computer graphics in general includes input via scanners, digitizers, or pattern recognition devices, and output on paper, film, or other media via plotters, printers, or film recorders.

Line drawing graphics started with two display consoles on the Whirlwind I computer in 1949 at the Massachusetts Institute of Technology. The Whirlwind I was a computer with only 1,024 words of memory that occupied a two-story building. In 1955 the Air Force SAGE defense system used one of the first multiconsole displays that allowed human feedback. A few of the early hardware suppliers included the Digital Equipment Corporation, the International Business Machines Corporation, and the Tektronix Company.



A basic menu-driven system

Interactive graphics has grown to emphasize the man-machine dialog in real time. For many people today, graphics means painting pictures on a desktop computer screen by choosing a few selections from a menu. There are hundreds of graphic devices and software programs available and more vendors than anyone can keep track of.

EARLY PROBLEMS

For writers and the average business user alike, graphics as the "window into the computer" has been both oversold and honestly misunderstood. Some of the early problems with computer graphics included very expensive, nonstandardized hardware systems and inadequate, nonstandardized software. Other problems with early graphics systems included the high cost of implementing sophisticated applications programs and the unexpected drain that graphics software placed on the mainframe computer.

However, computer graphics has coped with many of its early problems and is available relatively inexpensively for a variety of graphics applications. Gone is the exclusive emphasis on 2- and 3-D wire-frame abstractions of circuits, structural components, and chemical diagrams. In fact, many graphics systems actually allow you to produce pies, bars, and classy looking line graphs rather easily.

PEERING THROUGH THE HOOPLAH

There has been a lot of discussion about more ergonomically designed systems with easier-to-use features in the past year. Notwithstanding the availability of touch screen computers and desktop "mice" as input devices, graphics don't just happen. Someone at sometime has to input, construct, store, retrieve, manipulate, and if necessary, alter data in order to make pictures. Some of these functions may be accomplished by a software package and other capabilities may exist in the hardware. However, as the user, you must still understand the capabilities of the hardware and the software in order to get the output you want.

Most writers and business professionals who are interested in using computer graphics aren't interested in pixels, raster scans, electron guns, and raster-to-vector conversions. (I talk about writers and business professionals together since presentations graphics are an area we share in common.) And you don't have to concern yourself with the intricacies of the technology in order to choose and use graphics systems. As Larry Cain pointed out in the November 1983 issue of "*Popular Computing*" once you understand and strip out the video terms and computerese, the real criteria for evaluating various systems becomes clearer.

CHOOSING A SYSTEM

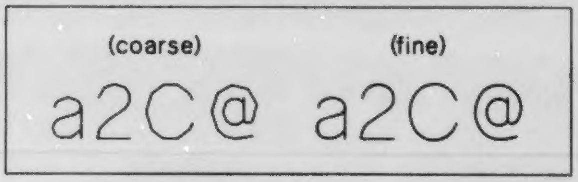
First of all, a good business graphics system should be easy to use. This implies a menu-driven system for most new users. However, be aware that a strictly menu-driven system may mean a lack of flexibility. There is a limit to the number of options any menu offers. Check the menu selections to see whether they offer you the level of control you need.

Secondly, a good system should meet your storage and retrieval needs. Does it have the capacity you need? Does it support the type of storage device you want to use? Does it create or store and retrieve pictures quickly? Obviously, fancy graphics are no good if they are a day late.

Additional criteria for evaluating a system include a close look at how much you can tailor the output. Are there a variety of typefaces available? How many characters-per-line can be drawn in a label? This type of formatting flexibility is important for creating more effective graphs.

If you have a need to produce hardcopy output in an unattended environment, look for a plotter or printer that has chart advance features.

And finally, what is the quality of the output? Check and compare the degree of resolution and the number of colors available. Resolution in a raster or dot matrix device (like a terminal screen or an ink-jet plotter) is often defined in dots-per-inch. Resolution in a vector device like a pen plotter is often defined in lines-per-inch. Of course in any device that uses a pen, the degree of resolution also depends on how wide the pen point is. Look at the "jaggies" on the edges of lines to compare different hardcopy outputs. Also look at the smoothness of curves in lettering as a measure of quality.



Character resolution

The heated debate over which system is better gets hotter every day. The criteria mentioned here are simply offered as areas for comparison.

BEWARE OF SOFTWARE PANACEAS

Business graphics software is now widely available on personal computers and small office systems. Menu-driven packages make it easier to produce graphs and require little or no programming experience.

There are still limits as to what graphics software can easily produce for a new user. The most sophisticated software packages are still relatively expensive and are command driven, not menu driven. These packages are designed to run on large computer systems and require more knowledge to install, maintain, and use. Once installed, they require a certain amount of learning time, even for experienced programmers.

Some of the less expensive packages may not have all the flexibility you require. Once you learn how to create simple line, pie, and bar graphs, you will want to create more complex graphic images. When you reach that point you may find yourself faced with learning how to program your output device directly. If so, you will discover that plotters, terminals, tablets, and other graphics devices are based on a unique set of graphics concepts. They each have their own machine level programming language. All of which means that "someone" will have to invest more time for you to get the output you want.

THE STATE-OF-THE-ART IN HARDWARE

The great news about graphics terminals is that all devices have more built-in capabilities than ever before. Features like selective line erase, high-resolution color, and brighter displays are available in terminals that cost less than $2,000. Video graphs can be produced very quickly and are stored easily as programs or files. They provide a convenient way to quickly produce, view, and manipulate various graphic designs. Of course, "softcopy" video graphs disappear when the device is turned off.

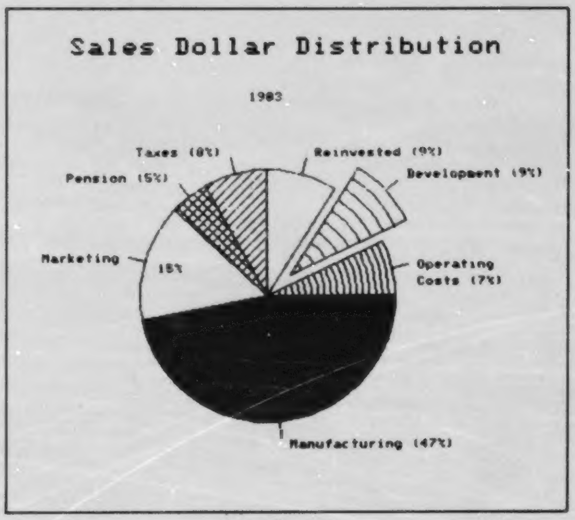
Capabilities in pen plotters that cost $4,000 only three years ago are now available for less than $2,000. Nowadays, plotters are more portable, smaller, faster, and are easily connected to personal computers. High resolution ink-jet printers and plotters provide more colors and faster "dumps" of screen graphs than was ever available before. All hardcopy devices that produce graphs on paper or transparency film take longer than video graphs, but provide charts or graphs for presentations, reproduction, or permanent storage.

As with software, there are limits to what the different types of hardware can do. For example, a common desire of personal computer users is to dump the fancy picture on a video (raster) screen to a pen (vector) plotter. However, without the proper raster-to-vector conversion software installed, this apparently simple task is almost impossible. It is the classic computer problem of hardware compatibility. To resolve it, you must know what you want to do before you decide on (and invest in) a system. Get a demonstration of the desired capabilities before you take it home.

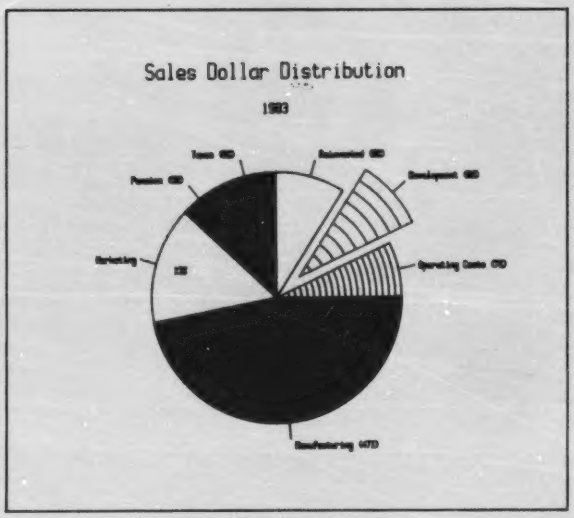
Technical communicators still use words and pictures on paper to communicate. And by all indications, we will continue to use paper to communicate for quite a while. Therefore, one of the most desirable features in a computer graphics system is for fast, high-quality output of text and art.

Unfortunately, the availability of low-cost, high-quality systems that allow words and pictures to be created, manipulated, combined, and output lags behind other areas. There are a few laser printers that can combine text and art in black-and-white output. However, few devices can combine text, color images, and speed, to produce high-quality camera-ready copy at a relatively inexpensive price.

The highest quality computer graphics output is currently produced by making a photograph of a terminal screen or plotter graph. Camera ready copy for printing is still prepared by combining the art with text using conventional reproduction processes.



Dot matrix output



Vector grapnics output

THE OUTLOOK

Computer graphics are here to stay and getting better. One reason is that business graphics can summarize pages of data in a simple chart or graph. Another is that a speaker presenting information with overhead graphics is perceived as better prepared, according to a Wharton Business School study.

A complete computer graphics system
with plotter, printer, and disc drive

If you want to get more first-hand knowledge of what is available, the Association for Computing Machinery (ACM) has an annual SIGGRAPH conference that showcases the leading edge of development in computer graphics technology. The National Computer Graphics Association (NCGA) has an annual conference that displays a wide variety of commercially available systems.

Everyone who has worked with a computer graphics system has their own special video war stories. In her 1983 ITCC paper, Kathleen Dolberg discusses some of her experiences as a graphics artist using computer generated images. She does a classic job of highlighting some of the constraints and possibilities in this fast moving area.

The moral of all the stories seems to be: keep your eyes and ears open and back off when you smell something fishy — something graphic may happen.

You Can Make Charts Like These with Grafmaster

Rosa Lee Echard

Rosa Lee Echard
Precision Visuals, Inc.
Technical Writer
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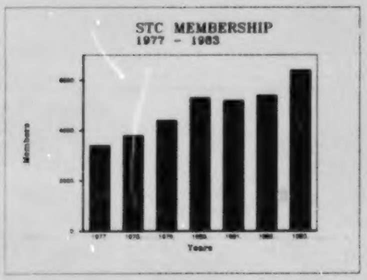
GRAFMASTER allows you to create the graphics needed to be more productive in today's business world. Whether you are a writer, editor, artist, or manager, you have occasions to use presentation charts. You may be presenting data to your immediate supervisor, or you may be preparing charts for an annual report. In either case, you would like to prepare nice charts as easily as possible.

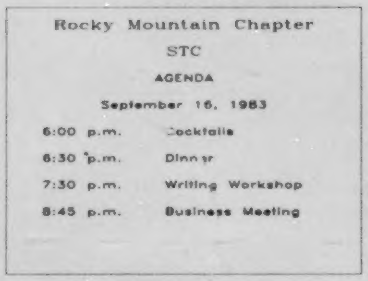
In the past, you would have taken your data to a graphic artist to have professional charts prepared. If the chart was to be used for an in-house presentation, you might draw it yourself. In either case, all professional presentation charts were prepared on the drawing board of an artist.

In the more recent past, you may have been able to use some of the technological advances of computer graphics. If you were a competent programmer, or if someone else in your organization understood the intricacies of computer graphics, you could produce presentation charts on computer output devices.

Although this bit of progress may have made preparation of presentation charts somewhat more accessible, a void existed for the easy preparation of presentation graphics. A manager might wish to ask a secretary or data entry clerk to prepare the charts; some managers might like to produce the charts themselves.

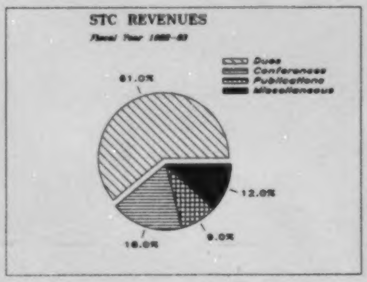
Precision Visuals believes they have developed a product that will fill this void. At this time, this product, GRAFMASTER, operates only on Digital Equipment Corporation's VAX computers. The workshop presented here briefly explains the concepts of GRAFMASTER, shows you how to use GRAFMASTER, and then allows you to produce your own charts.





Rocky Mountain Chapter
STC
AGENDA
September 16, 1983

6:00 p.m. Cocktails
6:30 p.m. Dinner
7:30 p.m. Writing Workshop
8:45 p.m. Business Meeting



Examples of GRAFMASTER Charts

Technical Exhibits: Planning, Designing, and Production*

Judy A. Morris, Barbara W. Edwards, and Kathleen M. Dolberg

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ABSTRACT

Technical exhibits are an important, dynamic medium for presenting information about technical advancements. They are used to communicate with peer groups, as well as to inform the general public of achievements in the technical fields. Planning the presentation of exhibits involves budgeting, logistics, design, time constraints, and personnel selection. The exhibit may be simple, as for a technical poster session, or complex, as for a large trade show or conference; and it involves many details and decisions in its execution. These details are handled best with careful planning, a good overall design, and the selection of good craftsmen to facilitate the production of the final exhibit.

INTRODUCTION

An exhibit is an important part of an overall communication plan. It may involve several forms of communication, including writing, photography, artwork, personal contact, and presentation. It gives the viewer a brief or "headline" sketch of topics presented and is primarily used to attract attention. Large, bold photographs and well-thought-out brief captions and text invite viewers to look and then to ask questions of the exhibit staff. This is where technology is exchanged, sales are initiated, and contacts are made.

Exhibit opportunities occur through various types of invitations, and care should be taken to select the exhibition that will accomplish the communication goal. Professional associations often invite exhibits at annual meetings. Exhibiting at professional association meetings is a particularly good opportunity to exchange information with peers, especially if the exhibit supplements a paper being presented. An exhibit booth at professional association meetings also is an ideal place for recruitment.

Commercial trade-show promoters mail invitations to likely candidates for regional and national technical meetings. This type of invitation probably will cost more for booth space and services; however, if the conference has been productive in the past, it may be well worth the expense and effort. Another type of invitation comes from civic or public institutions. Here, either the exhibit is meant to inform and educate, in which case the exhibit can be included in an educational outreach program; or the exhibit is meant to boost retail sales, as might be the case at a state fair exhibition.

If a corporation or institution sponsors a conference or seminar, an exhibit program will help pay expenses for the sponsoring organization. A nominal fee may be charged for exhibit space, and that fee may be applied to the cost of conference facilities, activities, and publication of papers. The exhibit may include overviews of work done at the facility, it may present a history of the organization, or it may target the theme of the conference.

PLANNING THE EXHIBIT

When the decision is made to exhibit and the contract is drawn with the sponsoring agency or exhibit promoter, activity in many directions starts with budget considerations. Ideally, there will be sufficient staff so that while one person handles message planning and text, others develop exhibit design, photographs, art work, backdrop structure, and logistics such as staff travel arrangements, paperwork for shipping and handling, and booth service. A good central coordinator will be able to bring together the efforts of several staff members to ensure professional exhibit production and a smooth presentation at the exhibition.

Exhibit costs can range anywhere from $50 to $50,000, depending on the structure, graphics, and reproduction process. When an exhibit is planned, therefore, an accurate cost estimate should be developed before proceeding. It will cost less to photo-reproduce copy rather than to silkscreen copy. It may be more economical to rent a backdrop than to build or buy one; a 10-ft exhibit rather than a 40-ft exhibit. Use options to develop an exhibit that meets budget constraints.

Many activities must be considered, planned for, and executed when an exhibit is being prepared. Figure 1 may be used as a checklist for areas to coordinate.

DESIGNING THE EXHIBIT

The design concept of the technical exhibit is the blueprint for building the exhibit. It is subject to changes and modifications by the author/inventor and the production manager as the production progresses. It describes the goals and presents the overall picture of the exhibit.

When a design is prepared for a technical exhibit, the emphasis or overall message that the exhibitor wishes to present should be defined. Each type of exhibit is handled appropriately for its particular message. For example, a display of a piece of equipment should explain what it is, why it was built, how it was manufactured, and how it works. Ideally the actual machine should be included in the exhibit or at least a model of it should show its working parts. A weaving loom exhibit might explain how the parts interact, how it is

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*This work was performed under the auspices of the U.S. Department of Energy.

CHECKLIST FOR EXHIBIT COORDINATION

TITLE OF EXHIBIT

DATE

LOCATION

BUDGET CONSIDERATIONS

Production
- ☐ Backdrop structure
- ☐ Photos and artwork
- ☐ Copywriting and editing
- ☐ Reproduction and mounting
- ☐ Silkscreen (photo positive, camera work, or screen process)
- ☐ Printed handouts

Shipping
- ☐ Packing and crating
- ☐ Transportation to and from
- ☐ Drayage (handling)
- ☐ Fork lift
- ☐ Set up and tear down labor

Booth Services
- ☐ Space cost
- ☐ Electricity, water, air etc.
- ☐ Carpet and furniture
- ☐ Cleaning
- ☐ Telephone service

Staff Travel
- ☐ Surface transportation
- ☐ Airfare
- ☐ Rental car or taxi at destination
- ☐ Hotel
- ☐ Per diem expenses

Promotion
- ☐ Hospitality suite
- ☐ Media advertisements
- ☐ Free tickets
- ☐ Tours

LOGISTICS: REQUIREMENTS & RESERVATIONS

Staff Travel
- ☐ Airline tickets
- ☐ Rental car
- ☐ Hotel
- ☐ Hospitality suite, if required
- ☐ Cash advance for per diem

Shipping
- ☐ Transportation waybill
- ☐ Drayage and storage
- ☐ Forklift and labor at destination
  - ☐ for uncrating
  - ☐ for recrating

Labor
- ☐ for exhibit set up
- ☐ for exhibit tear down

PLANNING THE MESSAGE

Outline Text

Storyboard
- ☐ Photos
- ☐ Artwork and graphs
- ☐ Headlines
- ☐ Text and captions

Space Design
- ☐ Select structure
- ☐ Design of graphics flow
- ☐ Design of models
- ☐ Design of hand-out literature
- ☐ Select or produce video cassette
- ☐ Design business cards, information blanks, etc.

Exhibit Production
- ☐ Select craftsmen
  - Writer/editor
  - Illustrator/designer
  - Photographer
  - Modelmaker/cabinetmaker
- ☐ Assign tasks
- ☐ Proof and approve final product
- ☐ Assemble and stage exhibit

PROMOTION

- ☐ Media Advertisements
  - ☐ Design
  - ☐ Place
  - ☐ Hospitality suite
  - ☐ Refreshments
- ☐ Tours
  - ☐ Tickets
  - ☐ Shuttle buses
  - ☐ Tour guides
  - ☐ Agenda and time schedule
  - ☐ Reservations clerk

STAFFING EXHIBIT

- ☐ Select personnel
  - ☐ Well groomed
  - ☐ Speaks clearly
  - ☐ Dependable
  - ☐ Knowledgeable
- ☐ One person to be in charge
- ☐ Two persons scheduled per shift

COMMENTS

Figure 1

Example of a coordination checklist to be used for planning and expediting an exhibit.

threaded, how the shuttle draws the threads through the warp threads, and what kinds of threads are used for weaving. Different types of looms might be interesting as a comparison device. An exhibit of a new computer system should explain the advantages of the hardware features and the software capabilities of interest to potential users.

Designers need to allow sufficient time for design creation and production of the exhibit elements. The design often can be done quickly. For example, it may take only a week from origination of conceptual design to final presentation to management. However, designing of an exhibit for a museum or exposition may take many months to prepare and execute. The designer should plan for the time needed to complete the entire exhibit from drawing board plans through the final product. Detailed exhibits with many hands-on models may require as much time as 3 to 4 months to prepare, whereas an exhibit with typed pages and several drawings, diagrams, and charts may take only a week.

How much physical space should a designer allow for the exhibit? A 3- by 5-ft bulletin board (vertical and horizontal space), a showroom case 5- by 10- by 8-ft high, or an entire room (length, depth, and vertical space) are factors that must be considered before the exhibit can be designed. The vantage point from which the audience will view the exhibit should be determined, whether they stand in front of it or they walk around and view it from many angles. Will the exhibit be located in a corner, in the center of a large hall, or along a straight wall (Figure 2)? Are electrical outlets accessible and where are they located? What electrical power is available? Is natural light or other lighting available or will artificial lighting be necessary? Would special lighting enhance viewing the exhibit?

Once the designer determines the preliminary factors, a checklist of materials and a rough layout (story board) of space may be prepared. This layout should help determine how many photographs, line drawings, charts, and maps will be needed. It should also designate where the working model will be placed. An acceptable display board system should be determined by correspondence with the conference/trade show coordinator and, if necessary, company addresses should be obtained for procuring the systems. Mountings should be chosen: matte board, foam-core, or both. A color scheme should unify the entire exhibit and attract the viewer's attention.

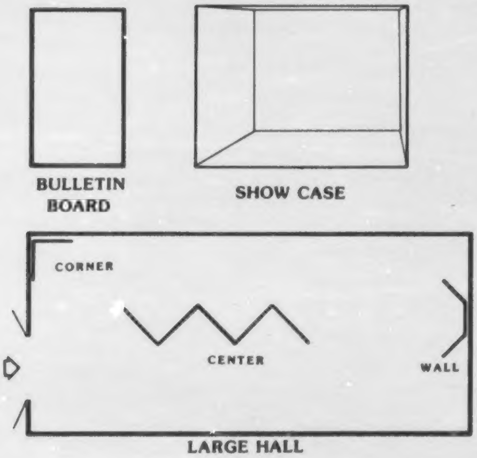

Figure 2
Exhibits may vary in size from bulletin boards and show cases to elaborate configurations in a large hall.

After the major considerations, the exhibit can be pulled together. If photographs have already been taken, determine enlargement sizes. Time should be allowed for new photographs, if necessary. A general layout should be made of the space, allowing room for photographs, text, headliners, equipment or models, and handouts.

The story-board technique helps check the layout and predicts how the viewer will scan the exhibit. The reverse S may be used as one scanning device because people tend to view exhibits in this manner. An appropriate type style and size should be used for the headlines and for the text. When a color scheme is decided upon, be sure that the colors blend well; contrast will give the eye a resting place before it moves on.

The equipment or model should be placed in the most advantageous location so that the audience has easy access for viewing and, perhaps, contact. Color, size, and materials should be specified for constructing the model. Will it need a pedestal (or pedestals), a dust-proof covering, or security case? Another important decision to make at this phase is how to label the parts of the equipment or model.

When these decisions are made, a final drawing of the exhibit should be made to include all the elements in the exhibit and any detailed drawings of the components that should accompany it (Figure 3). At Los Alamos National Laboratory, designers prepare a proposal to accompany the final drawings, which is necessary for budgeting the exhibit and is also useful to the production and set-up team.

PRODUCING THE EXHIBIT

Just as in building a house, producing an exhibit is a team effort. The production manager is the builder who follows the blueprint created by the designer. The production manager then works with the writer/editors, illustrators, photographers, modelmakers, cabinetmakers, printers, etc. Each person has his or her own style. Some photographers are better with portraits than with creative layouts for instruments. A cabinetmaker is not necessarily a modelmaker.

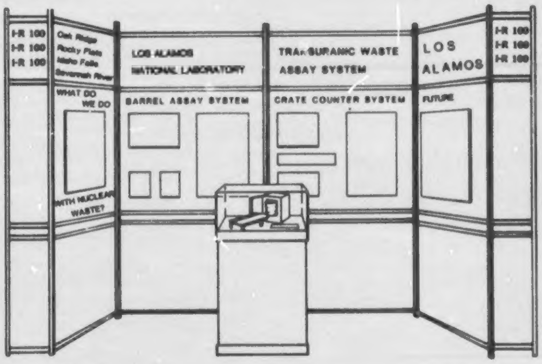

Figure 3
Proposed layout for a Los Alamos exhibit at the Chicago Museum of Science and Industry on display in September 1983.

How does one find the right person to do each job? At Los Alamos, there are many industrial photographers. To understand and use a photographic style, individual photographers should be interviewed about kinds of work they enjoy doing and examples of their work should be viewed. The same holds true for finding the right modelmaker, cabinetmaker, or illustrator. Some modelmakers make only static models, whereas others make models with moving parts. For a working model, whoever constructs it should be familiar with electricity or electronics. If display cases are needed for the models and the designer has specified a transparent, rigid plastic top, a cabinetmaker who is experienced in plastics construction should be employed because he or she will know how to glue the joints and polish the surfaces properly. If outside contractors are used for different jobs, it will take more time and legwork initially. Recommendations may be solicited from people whose opinions you value and who have used outside contractors; professional organizations may furnish references, and craftsmen may recommend specialists. When the team is called together, either on a one-to-one basis or as a group, the goals for the exhibit should be reviewed and the tasks assigned to particular persons.

A writer/editor should know best how to express the message of the exhibit and can help keep captions short and to the point. With writer/editor assistance, visuals may be coordinated with the text. Once the captions and text are final, the work should be taken to the phototypesetter/ printer. Although the designer has already chosen the type style, the production manager should size the type so that it is in correct proportion with the art work.

When silkscreening is needed, the silkscreener should be given camera-ready artwork. Quality camera and silkscreen workmanship is necessary for a quality presentation. Poor negatives or screens will produce fuzzy images or spattered backgrounds.

The production manager should consider the space allotted for the exhibit. Although the designer has laid out the physical space, as well as board space for photographs, illustrations, and text, sizes must be specified for the prints needed. When the prints are ordered, the type of photographic finish should be specified, i.e., matte or glossy. Printed handouts should be ordered at this time, too. Copying or printing should be arranged. Handouts help the audience to recall the exhibit and to enlarge on the information gained.

A time schedule with deadlines must be maintained so that the exhibit may be set up for previewing before it is packed and shipped.

EVALUATING THE EXHIBIT

After the exhibition is over, the exhibit coordinator, designer, and production manager all need to question whether the goals have been met. Was a large audience in attendance? Were they interested in the exhibit? Did they ask questions and seek more information? Did they become involved, both visually and physically? How much time did people spend looking at the exhibit and did they understand the visual story?

You also will want to evaluate

- the conference management: did they encourage audience attendance? were the space assignments fair? were the facilities adequate? did the agenda allow sufficient time for the attendees to view the exhibit?
- the booth service crew: were they efficient, and courteous? did they work quickly?
- exhibit transportation and handling: did it arrive undamaged and on time? was it returned in good condition?

Keep a file of the comments and evaluations for your exhibits so that you will have references the next time there is an opportunity to exhibit. This will help you decide whether or not to participate in future exhibits and will help build on knowledge gained from previous experiences.

What is Good Typography?
A Tutorial Emphasizing Digitized Type

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In the last several years typesetting methods, including the use of digitized type, have greatly expanded the design capabilities of technical communications. This increase is due primarily to the reduced prices of phototypesetting systems, making them more cost-justifiable for in-house publications and graphics departments. Even if technical communicators cannot afford in-house systems, industry advances now allow text to be transmitted to one of a number of typesetting firms with interfaces or media readers.

With this increased preference for typeset over typewritten copy, there is also an increased misuse of typography. This may stem either from type specifiers not being thoroughly familiar with a machine's capabilities or from the overuse of these capabilities. This paper outlines what good typography is and explains how to specify it to your operator.

WHAT IS DIGITIZED TYPE?

Any phototypesetting system consists of a photo unit that flashes light onto photosensitive paper or film to generate characters. Digitized type, however, is the result of instructions given to a cathode-ray tube (CRT) typesetter—or third-generation typesetter. In such a system, the fonts are stored as digitized information in the form of character outlines. The high-resolution CRT "draws" the characters at a very high speed by filling in the spaces inside the outlines and at the same time exposing the photosensitive paper.

Digitized phototypesetting systems differ from second-generation machines in that they are almost totally electronic (very few moving parts). In contrast, second-generation typesetters are mechanical in design; they contain spinning negative-film strips, discs, or rectangular "masters." In these mechanical systems, a lamp flashes a bright light through the clear character on the film negative, the light strikes the photo paper, and a character is generated. The mechanics are complex in this system: the film font, an escapement mirror, and the paper must be positioned within about .005 inch. Often this system cannot maintain base alignment and equal exposure over a character. In addition, because the assembly is so mechanical, the highest-speed systems are limited to about 50 newspaper lines per minute (lpm).[1]

In contrast, a digitized typesetter can output many hundreds or even thousands of lpm.[2]

POINT SIZE

Often, a second-generation typesetter has a lens turret with only a certain number of lenses to establish letter size. This means any other type sizes requested must be camera-enlarged or camera-reduced from typeset galleys.

The digitized typesetter, however, can contain all sizes from 4- to 127-point, ranging in ½-point increments. This allows for some 246 possible online point sizes.

This flexibility in point sizes gives experienced type specifiers a great tool for copyfitting. They can ask for a headline to be set in the largest point size that will let it fit into 42 picas, for example. Typographers no longer have to settle on type in 48- or 60-point type if they prefer something in between.

The great variety of sizes available online can cause problems, however, for beginning users of typesetting systems. Overwhelmed by the almost unlimited number of options, they may use too many different sizes or too large a size to be appropriate for the intended use.

Generally, three to four levels (sizes) of headlines and one or two sizes for body copy should be chosen. Any more than this can confuse the reader. This guideline excludes, however, special characters that by their very nature should be set smaller—superscript TM (trademark) and superior and inferior figures (superscript and subscript numbers).

LEADING

With the introduction of digitized type, typesetters are no longer bound by the limitations of electromechanical assemblies. Characters generated by the CRT can be placed almost anywhere, given the proper instructions. Fine *leading* (line spacing) increments of ¼ or ½ point can suit the design or readability needs of any typeface.

One common mistake, made by even experienced type specifiers, is to make the leading for text type too tight; rarely do you see too large a leading value. When leading is too tight, ascenders and descenders verge too close to each other or—even worse—touch, causing the reader to *double* (to read the line again).[3] One expert in typography feels that leading which is too tight results in word spaces larger than interline spacing and leads to visual confusion.[4] In any case, overly tight leading that impairs readability is poor typography (see Figure 1).

Palatino set solid (10 on 10 pts.) or without extra leading:

The Summer Seminar on Effective Communication presented by Dr. John Kirkman and sponsored by the El Camino Chapter was held on July 30 and 31 at Atari in Milpitas.

Eighteen students participated in the seminar and provided subsequent comments on an evaluation form that urged the Chapter to sponsor it again. Dr. Kirkman taught with humor and wit, tweaking the ponderous writing that everyone seems to feel is *technical writing.*

Figure 1. Tight Leading Value Used Poorly

Tight (even negative) leading can be used effectively, however, in display type. Its use can make a long, humdrum headline leap off the page with impact (see Figure 2).

A general rule for proper leading is to allow approximately +20 percent of the point size.[5] Therefore, the example in Figure 1 (set in 10-point type) should be on 12-point leading. Each typeface is unique, though; some, such as the Palatino used in Figure 1, should always have a substantial amount of leading to avoid having the ascenders and descenders touch. But other typefaces can almost be set solid (10 on 10) and still remain readable.

AMERICAN MILITARY POWER IN THE 1980s
AND THE ORIGINS OF THE NEW COLD WAR
ARSENAL OF
DEMOCRACY

Figure 2. Tight Leading Values Used Effectively

LINE LENGTH

The wrong line length for a text-size typeface is another common typesetting error. In most cases the line length is too long. This also causes doubling.

So many technical illustrators and writers with the new-found responsibility for specifying type apply their typewriter-based rules and experience to typography: "If it's 8½ × 11-inch paper, we need a one-inch margin on each side." The resulting line length of some 39 picas is far too long, however, for 10-point type; typeset characters are much smaller than 10- or 12-pitch typewriter characters. To stay within these design parameters, it is better to use two columns, each one 17 to 22 picas in length.

In some cases, technical communicators use a line length that is too short and justify the lines as well; huge wordspacing and letterspacing results from the insufficient number of hyphenation spots in each line (see Figure 3). If the line length is still to be kept short, setting the copy flush left/ragged right (as in Figure 3) or flush right/ragged left is more satisfying visually.

A good rule of thumb is to set your desired text typeface in several continuous lowercase alphabets; you then see that your maximum line length is between 1½ and 2 alphabets long.[6] A simpler, although not as accurate, method is to multiply the point size by 2. The resulting figure is the approximate line length in picas that should be used.

SPECIAL
REPORT
Passages in
A Nation at Risk,
the document that
has initiated a
fundamental de-
bate about U.S.
education, could
have been written
by a concerned
chief executive.
They tell of
a nation losing its
industrial pre-

SPECIAL
REPORT
Passages in A Na-
tion at Risk, *the*
document that has
initiated a funda-
mental debate
about U.S. educa-
tion, could have
been written by a
concerned chief ex-
ecutive. They tell of
a nation losing its
industrial pre-emi-
nence because of

Figure 3. Type Set on a Narrow Line Length

EXPANDED AND CONDENSED TYPE

The electronics in a third-generation phototypesetter allow the operator to expand or condense any typeface. Used with discretion, this capability lets you change the length of the x-axis of any typeface to create a more compact, tight-looking design or, conversely, a wider, more open look. Thus you can fit a headline into a certain allotted space and still maintain the same height (point size). You can also make a lot of text fit nicely into an area that otherwise could never accommodate it (see Figure 4). If done in moderation, electronic condensing is usually more successful than expansion; most electronically expanded typefaces have that "stretched balloon" look.

Helvetica Light (not electronically altered)

The Games Division typesetting service of Atari, Inc., provides high-quality phototype for technical information, trade ads, brochures, game graphics and labels, and marketing purposes. A wide selection of over 50 contemporary typefaces is available, ranging from 4- to 72-point size. All typefaces may also be expanded, condensed, and/or italicized (slanted) in either direction. A high-speed digitized typesetter produces output up to 70 picas wide (11⅔ inches).

Helvetica Light (electronically condensed)

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Figure 4. Electronically Condensed Type

Because typesetting systems don't have the intelligence to recognize whether or not grotesque distortions will result from this electronic manipulation (see Figure 5), the type specifier or typesetter must use judgment. Remember that condensing and expanding will change the shape of the characters: a round bullet will become a football, and a square em box will become a rectangle. Overly condensed or expanded type will result in unreadable text, even in large sizes.

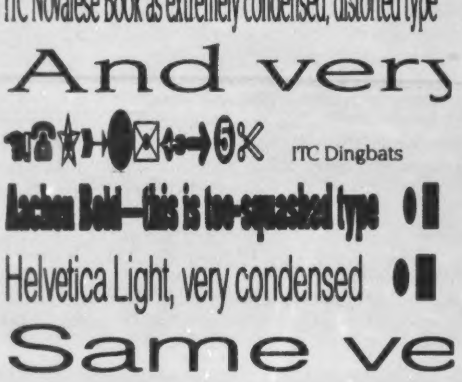
ITC Novarese Book as extremely condensed, distorted type
And very
ITC Dingbats
Aachen Bold—this is too-squashed type
Helvetica Light, very condensed
Same ve

Figure 5. Electronically Distorted Type

PSEUDOITALICIZED VERSUS TRUE-CUT ITALIC TYPE

Pseudoitalicizing, a feature that became available with the introduction of third-generation typesetters, is slanting the characters to the right (or left) at some predetermined angle. This function enables you to obtain a reasonable-looking italic, especially if a particular family was not designed with italic typefaces.

Figure 6 shows several typefaces in their roman (upright), true-cut italic, and pseudoitalicized versions.

Helvetica Light, with true-cut italic
This game will test itself and provide data to show that the game circuitry and controls are operating correctly. *No additional equipment is required for the self-test.*

ITC Garamond Light, with true-cut italic
This game will test itself and provide data to show that the game circuitry and controls are operating correctly. *No additional equipment is required for the self-test.*

Helvetica Light, with pseudo-italic
This game will test itself and provide data to show that the game circuitry and controls are operating correctly. *No additional equipment is required for the self-test.*

ITC Garamond Light, with pseudo-italic
This game will test itself and provide data to show that the game circuitry and controls are operating correctly. *No additional equipment is required for the self-test.*

ITC Century Light, with true-cut italic
This game will test itself and provide data to show that the game circuitry and controls are operating correctly. *No additional equipment is required for the self-test.*

ITC Novarese Book, with true-cut italic
This game will test itself and provide data to show that the game circuitry and controls are operating correctly. *No additional equipment is required for the self-test.*

ITC Century Light, with pseudo-italic
This game will test itself and provide data to show that the game circuitry and controls are operating correctly. *No additional equipment is required for the self-test.*

ITC Novarese Book, with pseudo-italic
This game will test itself and provide data to show that the game circuitry and controls are operating correctly. *No additional equipment is required for the self-test.*

Figure 6. Pseudoitalicized Versus True-Cut Italic Type

As you can see, the simplest design (Helvetica) is the most workable, with almost no discernible difference between true-cut and pseudoitalic. The more intricate true-cut italic typefaces, however, such as the ITC Garamond, ITC Century, and ITC Novarese in Figure 6, provide much more contrast (and thus more emphasis) to the roman styles than the pseudoitalic versions. It is best, therefore, to use the true-cut italic form with these typeface families (as well as with others) if your typesetter has one available to complement your chosen roman typeface. If not, a pseudoitalic can be very useful, provided a typeface with a simple design is chosen.

KERNING

Kerning is the reduction of space between certain character pairs, such a TA, AW, Yo, Te, LT, etc. If kerning is not done, gaping holes result that appear almost as wide as the word spaces and can lead to confusion in the reader's mind (see Figure 7). Kerning will improve the legibility and visual impact *(color)* of the copy.[7] The larger the point size, the more obvious is the lack of kerning.

Manual kerning requires an operator to memorize the major character pairs (over 50) and to insert a backward-move code between these characters. These codes vary with different typefaces, further complicating matters. Automatic kerning, though, requires no operator intervention; once the program is turned on, the software calculates how much white space should be reduced between the character pairs which require it.

STATE-OF-THE-ART
Typography Is Easy To
Achieve If You Have The
Right Tools

STATE-OF-THE-ART
Typography Is Easy To
Achieve If You Have
The Right Tools

Figure 7. Type Set With and Without Kerning

Automatic kerning exists on second-generation machines. However, it often clutters the typesetter's screen with an incredible number of codes, making it difficult for the operator to later edit the text. On third-generation machines, automatic kerning is a background operation: the operator never sees the calculations, and the type is usually printed without kerning errors.

When having your copy typeset by outside type houses, look at samples of their work, particularly the headline sizes; examine the use (or misuse) of kerning. Their samples are just like an illustrator's portfolio: their talents are also on display.

If, however, your copy is being typeset in-house, you may run into a touchy situation. If the typesetter operator does no kerning, she may simply be inexperienced. On the other hand, she may complain that her machine has no automatic kerning capability and she has no time to add the codes herself, due to a heavy workload. In this case you will have to negotiate with her supervisor.

Remember that any typesetter with an interface should be able to automatically handle kerning. The translation tables required for code conversion can also contain kerning information.

LETTERSPACE TIGHTENING

Most typefaces need some amount of uniform space reduction between the characters. Tightening letterspacing reduces the space required for a given amount of text and greatly improves legibility. However, in the hands of the inexperienced, it can prove disastrous for typographic communication. Unfortunately, this is one of the most common problems in typesetting, especially in advertising copy.

When letterspacing is too tight, you create new characters that you never knew existed in the English language (see Figure 8). In addition, the areas of heavy texture where letters come very close or touch can tire the eye and cause it to stop where it's not logical to do so or to jump from one black spot to another, breaking up the sentence structure.[8]

Second-generation-system operators had to remember proper letterspacing values (often called *compensation*) for each point size, and these values differed among typefaces. Third-generation typesetters, though, automatically tighten letterspacing by the proper amount for every point size and every typeface; the operator simply chooses one of three levels—small, medium, or large (the large amount of compensation may cause certain adjacent characters to touch very slightly).

Type specifiers should attempt to equal the "color" of the top example shown in Figure 8 or as shown in the text of this article. Note that some typefaces will require more or less letterspacing. In general, you should strive for a compact fit that does not allow adjacent characters to touch.

The Mercedes-Benz 300SD Turbodiesel is one of the most expensive, least extravagant corporate automobiles you can buy.

The 300SD is $38,000 worth of automotive enlightenment—a corporate flagship meant to stress not pomp but efficiency. Meanwhile, its retained value over the past three years has been shown to *average* 90 percent.

Does your company have the technology of the 1990s in its executive offices, and the technology of the 1950s in its executive garage?

The fact is that inefficient operation, excessive size and savage depreciation need *not* define today's corporate flagship. The 300SD Turbodiesel represents a different and refreshingly more sane equation.

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The fact is that inefficient operation, excessive size and savage depreciation need *not* define today's corporate flagship. The 300SD Turbodiesel represents a different and refreshingly more sane equation.

Figure 8. Type Set With Proper Letterspacing and Letterspacing That Is Too Tight

WRONG-READING TYPE

Wrong-reading, or *mirror-image*, type is used by some people whose facilities are set up for positive-film makeup (see Figure 9). The type is exposed backward on the emulsion side of film (not paper), so the right-reading image can be in direct contact with a printing plate.

Digitized typesetters can easily output such type because it's only a matter of instructing the CRT to reverse the type in each line: what usually is "printed" on the left side is instead printed on the right.

A second-generation phototypesetter cannot output wrong-reading type. The artist has to shoot film positives of all the type galleys in order to produce wrong-reading film images. This is an expensive and time-consuming process.

CONCLUSION

If technical communicators are keepers of the printed word, they must strive to put forth their messages as clearly as possible. Good typography is an *integral* part of that message. Every small typographic problem is a hindrance to clearly understanding that message. When we put obstacles in the paths of readers, they may eventually become bored and disinterested.

Poor writing and editing can never be cured by excellent typography and a fabulous design, but high-quality design and typography integrated with good writing and editing will work wonders to convey even the most difficult message.

REFERENCES

[1] The usual definition of a newspaper line is 8 or 8½-point type set on 11 picas justified.

[2] For a more detailed discussion of typesetters, see Larkin, Sheila. "The Effects of Computers in Typesetting," *Proceedings of the Twenty-Ninth ITCC*, Boston, May 5–8, 1982, pp. G-31 to G-34.

[3] Haley, Allan. *Fine Typography.* Lecture given at TYPE-X '81, New York City, October 1981.

[4] Jedrzejek, Peter W. *Publications Design*. Seminar given in conjunction with the Gutenberg Festival, Long Beach, California, May 1983.

[5] Haley, *Fine Typography.* Lecture, October 1981.

[6] Jedrzejek, *Publications Design*. Lecture, May 1983.

[7] Compugraphic Corporation, Type Division. *MCS Kerning and Compensation*. Wilmington, Massachusetts, 1982.

[8] Haley, *Fine Typography.* Lecture, October 1981.

Note: When this paper was presented at the 31st ITCC, it was illustrated with many more examples of good and bad typography. This article was prepared with the WordMARC word-processing program (formerly called MUSE) that runs on a Digital VAX-11/780 computer. The copy was then transmitted via direct cable connection to a Compugraphic® Modular Composition System™, which is equipped with an interface. The text is set in Compugraphic Palacio, a copy of Palatino.

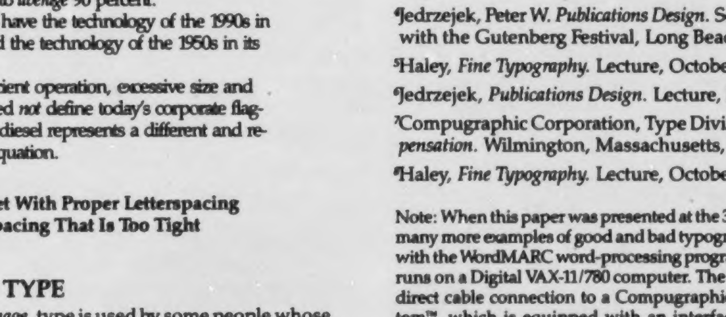
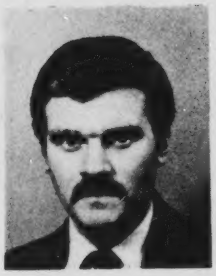

AMERICAN MILITARY POWER IN THE 1980s
AND THE ORIGINS OF THE NEW COLD WAR
ARSENAL OF
DEMOCRACY

Figure 9. Wrong-Reading Type

Wordless Instructions—Say It with Pictures

Herbert E. Vogt



Herbert E. Vogt
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Communication Products Division
Staff Information Developer
Research Triangle Park
North Carolina
(919) 543-3955

I have found many places in technical communication where pictures can be used instead of words to communicate.

In this paper, I discuss the benefits of wordless instructions and show examples. I describe the process I use to develop and produce wordless instructions:

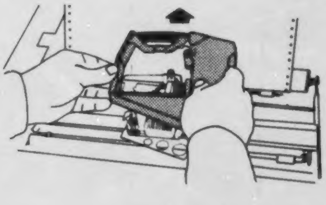
- *How I write descriptions for pictures*
- *How I convert from the descriptive word mode to a picture mode*
- *How I produce dynamic line drawings that show action*
- *How I arrange and lay out the pictures*
- *How I make sure my wordless instructions work.*

A picture can save you a thousand words. A picture can also do a better job of communicating than a thousand words can. I have found in many cases that self-explanatory photographs and illustrations can replace words. In this paper I show you examples of where wordless instructions can be used. I discuss the advantages and benefits of wordless instructions and show you how I plan for and produce my wordless instructions.

Wordless instructions can be used many places in technical communication:

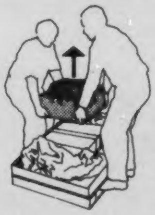
Publications

Wordless instructions can be used in procedures and instructions within such publications as operations manuals, maintenance and repair manuals, and parts catalogs.



Instruction Guides

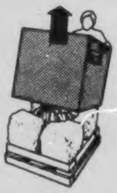
Wordless instructions are ideal for packing, unpacking, setup, and installation guides. I have been able to produce entire sets of instructions and guides without using words.



Labels and Decals

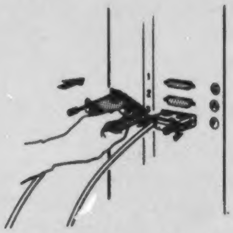
- Cartons and packages

  To show how to open.



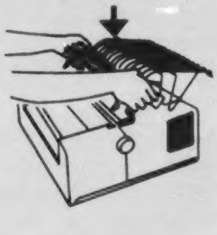
- Machines

  To show how to open covers, load paper, thread ribbons, move switches, turn levers, remove paper jams, and connect cables.



- Parts

  To show how to install or remove, and which way to turn, pull, or push.



The following procedure shows how I plan, develop, and produce the pictures for my wordless instructions. It shows how I determine what pictures are needed and how I produce them.

1. Plan the Pictures

I start by writing a description of the information that I plan to put into pictures. This helps me to think out and organize what I want to convey.

For a single wordless instruction such as a label or decal, I write a detailed description of everything that I want that wordless instruction to convey.

If I am planning a process or procedure that requires a number of pictures, I make up an outline or list of steps. I try to keep descriptions and steps as brief as possible.

I always write my descriptions, outlines, or lists of steps in the active voice. I find it is easier to convert words to pictures if I write in the active voice, rather than the passive voice. Also it allows me to produce pictures that show action.

Verbs have two voices:

1. **Active** - An active voice verb indicates action done by the subject. (The subject acts.)

   Press the power switch to turn on the printer.
   Turn the platen knob to advance the paper.

2. **Passive** - A passive voice verb indicates action done to the subject. (The subject receives the action.)

   The printer is turned on by pressing the power switch.
   Paper is advanced by turning the platen knob.

Figure 1 shows an example of a list of steps required to unpack a display terminal. Each step is a brief active voice statement.

Display Terminal Unpacking Instructions

Steps required to unpack:

1. Pull open covers on top of carton.
2. Remove shipping pad from carton.
3. Remove box containing keyboard from carton.
4. Remove keyboard from keyboard box.
5. Remove display from carton.
6. Remove protective cover from screen and all tape on display.
7. Remove protective bags from cable connectors.
8. Locate display terminal setup instructions.

Figure 1. Outline for Display Terminal Unpacking Instructions

2. Develop Descriptions for the Pictures Needed

From the description, outline, or steps developed in step 1, I now determine what pictures are needed and the details each picture should contain.

Figure 2 shows the process I use to convert from the active voice word mode to an active picture mode. I use this method to convert my word descriptions into a list of picture descriptions.

Active Voice Description/Statement *Pull open covers on top of carton*

Conversion Chart

Word Mode	Subject (human element)	Verb (action)	Object
	You (implied)	*pull open*	*covers on top of carton*
Picture Mode (Description of what is to be in the picture)	Picture of a person next to carton	Persons hands shown pulling top of carton open	Picture of carton

Figure 2. Converting from Word Mode to Picture Mode

3. Take Photographs

Once I have a description of each picture needed, I arrange a photo session. I arrange to have the actual product and all necessary additional equipment and supplies made available. I line up people to act as models. I try to arrange to have the photo session in an area with light-colored floors and walls with as few distractions in the background as possible.

When I am photographing, I like to use people in action poses operating and handling the product. I position people in self-explanatory action poses. Using people, especially showing the positions of their hands, allows me to eliminate words by showing how to hold an object; how to lift, carry, or move things; how many people are required to do a task; and how to move levers, insert diskettes, put parts together, and remove things.

I have found through testing that people relate more quickly and with more accuracy to pictures showing people in action poses rather than in static pictures that show a picture of the product with callouts to the parts where some action is to be performed.

I take the photographs with either an instant-photo or a 35-mm camera. The amount of detail I want to show and the time schedule I am working under determine which camera I use.

Because the photographs I take are used mostly to make line drawings from, I have found the instant-photo camera produces adequate sized and quality pictures for this purpose. When I need larger pictures or pictures showing details or closeups, I use a 35-mm camera. I use 35-mm negative film and send it to a photo processor and ask for a contact sheet, which is an 8- by 10-inch sheet of photographic paper containing a miniature print of each exposure from the roll of film. I then have 8- by 10-inch or larger enlargements made of only the exposures that I will use to make pictures.

With wordless instructions, each picture must be self-explanatory. I cannot add words to make up for an incomplete picture.

4. Make Line Drawings

In most cases, I make line drawings from the photographs rather than use photographs. I like to use line drawings because I can control the amount of detail I put in the picture. I can easily revise the line drawings. In addition, they can be copied and reduced on an office copier.

I make line drawings by putting tracing paper over the photograph and tracing only the areas that I want in my wordless-instruction picture. Placing the photograph with attached tracing paper on a light table allows me to better see detailed areas in the photograph. Figure 3 shows an example of a tracing made from a photograph.

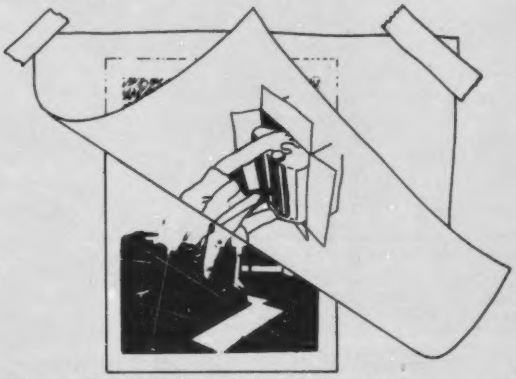


Figure 3. Example of a Tracing

5. Add Action and Emphasis

I add additional action to my line drawings (or photographs) with action arrows. These arrows eliminate words by showing direction such as which way to turn knobs and adjust screws, tighten and loosen nuts, assemble and remove parts, and open and close covers.

I either draw in the action arrows or obtain them from adhesive-backed preprinted art sheets. The arrows from the art sheets are quick and easy to work with. With the adhesive backing, they can be attached directly to photographs and line drawings.

I like to use forms of shading (and color when the budget allows) to emphasize the subject and action in each picture. I use this technique to help the user's eye quickly find the subject and the action to be done. When working with black and white, I use bold black arrows to emphasize action and shades of gray to emphasize the subject. Figure 4 shows examples of wordless instructions with the subject and the action highlighted.

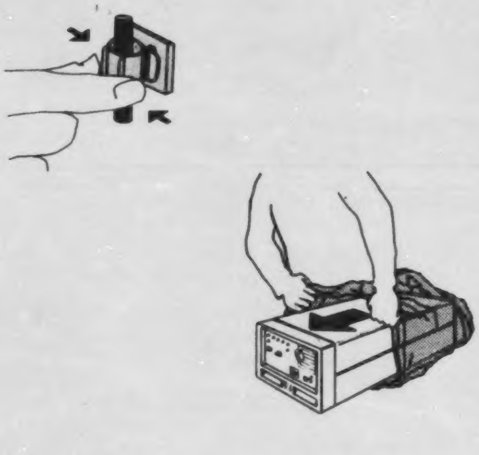


Figure 4. Emphasis Using Shading

6. Analyze and Arrange the Pictures

After completing all the pictures, I analyze each one for accuracy and then arrange them in logical order. I start by laying the pictures on a table in the same sequence as that of my original outline (Figure 1). I compare the pictures with the outline and the word-to-picture mode charts (Figure 2) to see if the pictures are self-explanatory and fulfill the requirements.

I then look for ways to arrange the pictures in a sequence that is logical and most practical for the user. For example, if the process involves the user's moving around a machine doing various things to the front and then the back, I arrange and group the pictures so the user first does all the required steps on the front and then moves around and does all the required steps on the back of the machine.

Once I am pleased with the sequence, I number the steps to ensure that the user follows them as I have intended.

7. Layout the Wordless Instructions

Using the numbered pictures, I lay out the finished page following the rules of normal reading order: from left to right and top to bottom. I attach the pictures to the page using transparent tape or adhesive.

I like to group my instructions into modules by putting a border around each picture. Each module is one complete action or operation. Refer to *Figure 5* to see the complete *Display Terminal Unpacking Instructions*. The instructions are reduced in size from the original ones.

I lay out and put together my own review drafts. After the instructions have been tested and reviewed and any changes have been incorporated I give the instructions and the photographs to an illustrator to prepare the final camera-ready copy.

8. Test and Review the Instructions

Before I send any wordless instructions out to the field, I make every effort to ensure that they are accurate and that they can be used by the intended audience.

First, I have the completed wordless instructions reviewed by the engineering and marketing departments. Next, I make arrangements to test the instructions to verify their usability. I arrange to have the product made available to test subjects that are representative of the intended audience who is to eventually use these instructions.

Summary

With the process described in this paper, I can design and produce wordless instructions that are:

- Easy and quick to produce
- Easy to revise
- Easy and inexpensive to reproduce
- Easy and quick for a user to comprehend
- Universally understood to eliminate the need for translating the instructions for use in other countries.

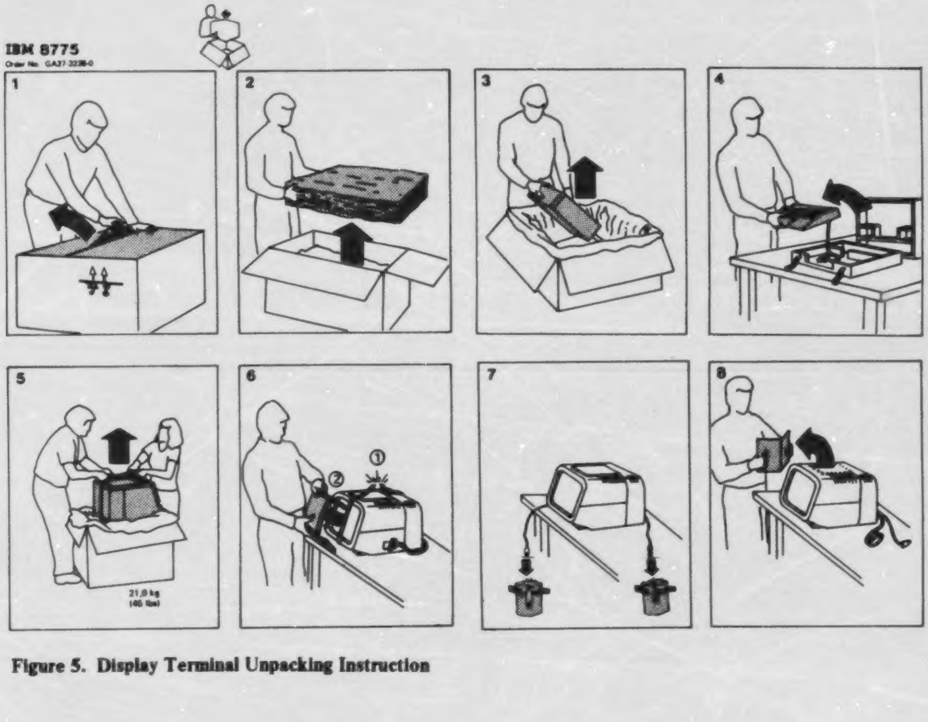


Figure 5. Display Terminal Unpacking Instruction

Page Design for Data Processing User Documentation

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This paper describes research and development of two new page designs using current techniques such as information mapping and a grid structure to increase readability.

INTRODUCTION

I'm sure you all have noticed that technical writing is not really intended to be read. It is not to be read paragraph for paragraph like a well-written novel or biography. Nobody curls up with a good manual and reads it from cover to cover.

The reader is more apt to scan a few pages of the manual, consult it from time to time, or use it to learn a procedure. It is the technical writer's job to make it as easy as possible for the reader to get information in this way.

I'd like to discuss one way we increased the readability of computer documentation where I work. I'm one of a group of about sixteen technical writers in Standard Oil's Computer Services Department. Some months ago, we decided that the page layouts in our user guides weren't helping the reader enough. I'm going to describe how we improved our standard with rather strictly limited technical means.

Here's what I'll cover;
- Our setting and the technical constraints worked with
- The problem and strategy
- A description of the improved formats
- A brief evaluation of our results

SETTING

Technical Constraints

In our department, we store and process documentation files on the mainframe computer. With all its powerful advantages, this situation imposes strict technical limits on the graphics we can use for publishing.

Our printers and text-handling software were chosen with computer reports as a major consideration, along with traditional business reports and correspondence. They are not specialized for publishing.

For instance:

- The printers and software are set up to print with fixed-space typewriter style characters, at six lines per inch
- The number of fonts used with a document is limited, and locations of font changes are restricted
- The text entry and editing software (based on Waterloo script) is tedious to use and limited in formatting capability

Cost-effectiveness

Since our documents are mostly for internal use, it is sensible to spend no more on production per master page than one would for a routine internal report. Furthermore, most of our editions are small. In changing our format, we understood that we would need to work with the technology at hand.

Standardization

Along with these limitations, we had a strong advantage. The technical writers and text entry staff share a set of standards for published material, which management and users have accepted. We did not have to impose standards, but more simply, we needed to propose some changes.

Trends in Technical Writing

Like most technical writers, we use a modular approach to computer documentation. And more and more, we emphasize the use of identified blocks of text and tabular layouts. By this I mean Information Mapping, as evolved by Information Resources, Incorporated. Any change we proposed would have to support our way of setting out information in blocks and modules.

OUR PROBLEM AND STRATEGY

Definition

Let's clear up any possible confusion between a format and a page layout.

- **Format** is a basic structure for guiding the placement of text and graphics on a page, with a specified family of typefaces
- **Layout** is the actual arrangement of text and graphics on a specific page, using the format

Format is not a cast-iron mold. The format is used as a basis for layouts that best present the information. A consistent format within a document makes an understandable geography for the reader's fact-finding journeys. For a periodical or series of documents, a format creates a recognizable identity and saves the effort of inventing the new basic designs for each edition.

Goals

Our major goal was to create a format that would help us make the key information easier to locate and understand. Support for the reader was what we were after.

Our proposal also had to consider economies of text processing and the technical constraints I've mentioned. Another goal was to get management approval to modify the style that had been in use for a number of years.

Finally, my boss asked me to get a consensus from the entire technical writing group before presenting a design to the rest of the department.

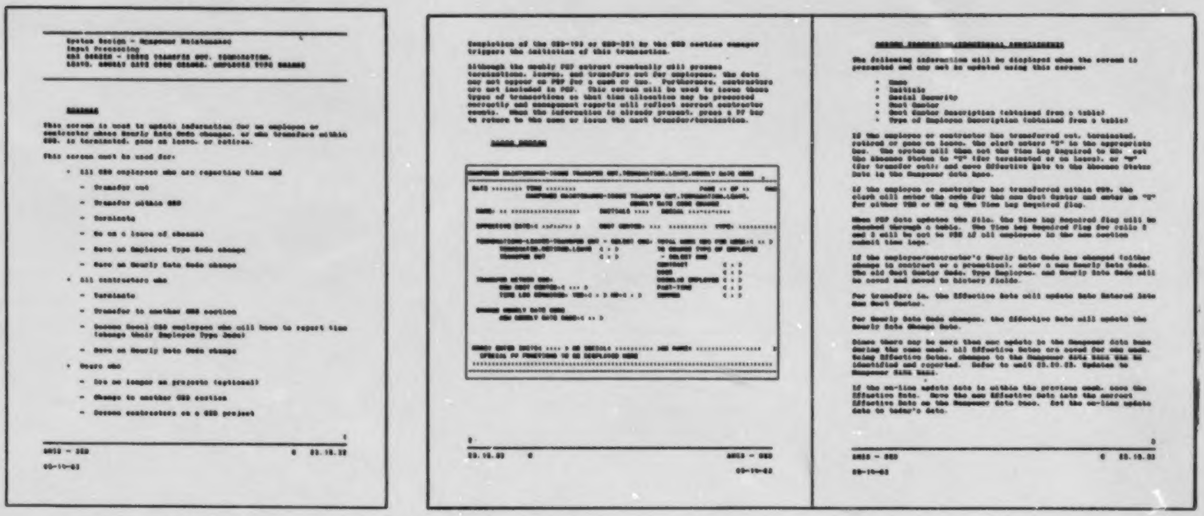


Figure 1. Old page layout. Chapter opening (left) and typical two-page spread (right).

Old Format

Figure 1 shows how a typical page layout looked with the old format. The main problem we saw was that important ideas got imbedded in a mass of secondary text. The design makes it hard for the reader to find and focus on the key points.

How We Worked

I confess that my first thought about consensus was to remember the old saying that a camel looks like a horse designed by a committee.

Before I was a technical writer, I had experience as a typographer and book designer, and I was used to working on my own. But I now have learned the wisdom of getting a consensus. The people who will use a format deserve a chance to iron out the shortcomings and impractical features of the proposal. The eventual design is likely to be stronger and more broadly useful. Acceptance develops naturally out of this process, and implementation is smoother.

The technical writing group met a number of times, first to discuss basic requirements, and then to review possible solutions. I kept on sketching formats that might work, and everyone in the group reviewed them and made suggestions. Then samples were produced by the text-entry crew. After a number of revisions, we arrived at a design that everyone could live with.

My task was a balancing act. I needed to make the best use of the group's ideas, keep my own design objectives in view, and end up with a workable basic format. In addition, I designed standard title and contents pages that would coordinate with our basic page. These also were reviewed and accepted by the technical writers and editors.

After reaching group consensus, we showed our ideas to company graphic designers. They made a couple of minor adjustments, but basically liked what we had done.

Management Approval

We invited the support of management by circulating samples of the two new formats being proposed. We talked individually with managers who were known to have their own preferences. Some practical suggestions came back, and we used any that would work within our basic idea.

Implementation Problems

Once we started using the new format, unexpected technical difficulties emerged. We thought we had sufficiently accounted for the technical constraints. The text entry group had been able to produce excellent sample pages. But in using the format for a whole document, in the production setting, we ran into trouble.

During design development, some text-processing and formatting problems had been solved in ways that could not be used as standard production methods. The problems involved incompatibility between our text-processing software and the Xerox 9700 printer. This bad fit has made extra programming necessary.

THE NEW FORMATS

Let me explain the new formats and some of the factors we considered.

Basic Decisions

We decided to keep the 8½-by-11-inch sheet in a 3-hole ring binder as our basic trim size and binding style. We chose the Xerox 9700 laser printer as our standard printer.

Two New Formats on One Grid

For flexibility, we provided two basic formats instead of one. Both are based on the same two-dimensional grid (see Figure 2).

The grid seems complicated at first glance, but the idea is simple. The vertical and horizontal lines are guides for placement of text and illustrations on the page. The horizontal lines are numbered from the top of the page, allowing six lines per inch. The vertical lines are designated by column, or position, numbers for four type pitches—10, 12, 15, and 18. In discussing the grid, I will refer to the 12-pitch column numbers.

Looking first at the vertical lines, columns 7 and 95 mark the very outside margins. Items of control information, such as running heads and folios, are placed flush left and right to these points. These outside margins also accommodate oversized illustrations and wide tables without our having to turn them sideways.

Columns 14 and 88 mark the standard margins for text. We made these side margins wider than in the old model, as one of our main objectives was to shorten the text line. Within those margins, three main columns are marked out. As much as possible, we use these as a guide for consistent placement of text blocks, tabular material, and illustrations.

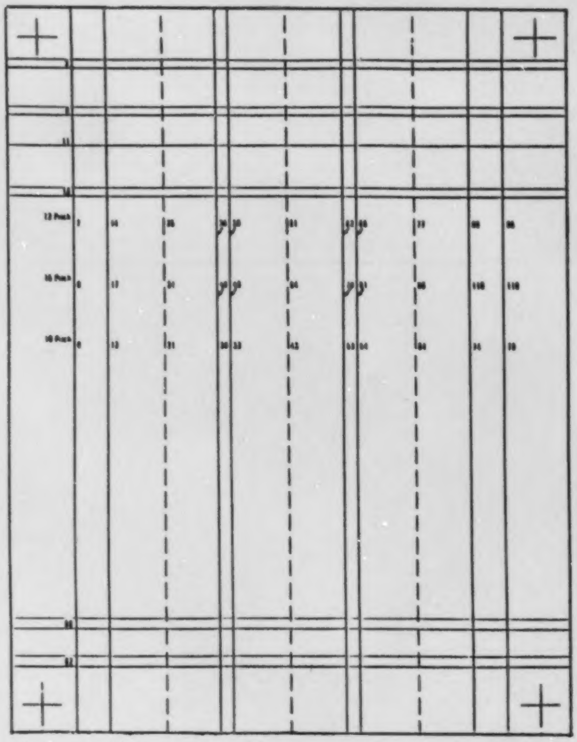


Figure 2. Grid for page design.

In general, we keep to a flush left (block) style. This means that we avoid centering. To produce an uncluttered page, we also discourage use of indenting schemes to show subordination. We rely on typeface variety for that.

The horizontal lines are guides for placement of headers and footers, unit openings, and the body on continuing pages.

The grid is not only a layout tool for us, but also a way to specify standards and explain design ideas. Each technical writer and text-entry specialist has a copy printed on clear acetate. Useful as it is, however, the grid does not eliminate the need for a good eye, a feeling for effective layout.

Design Considerations

Our survey of studies on document design brought out a number of design issues. Some of them concern readability—not the kind that is measured by reader comprehension, as by fog indexes, but readability as measured by reader comfort. Others concern what we call findability—qualities that make it easy for the reader to locate and focus on the information he needs.

On readability, we found that the reader's ease and comfort are supported by:

- Type with serifs
- Proportional type
- Type size of standard book size—9 to 12 point
- An optimum line length proportional to type size and the white space (leading) between lines. For 12-pitch type at 6 lines per inch, a little more than 4 inches (25 picas) is the longest line that is easy to scan.
- Ragged right margin

Regarding findability, we learned that the reader's ability to locate and focus on the information he needs is supported by:

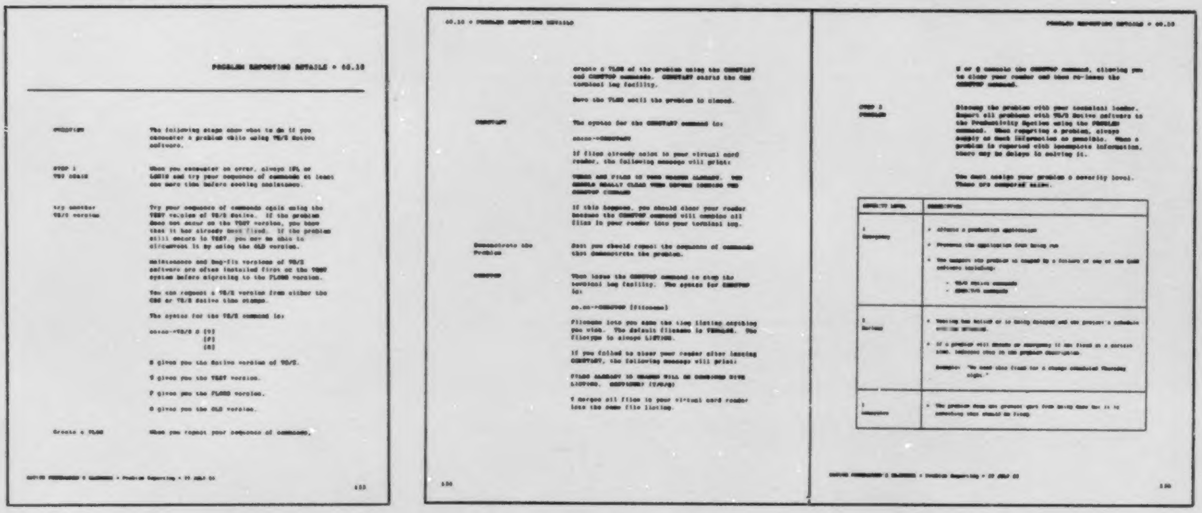
- Consistency in layout—items in predictable locations
- Information blocked out and labeled
- A range of type variations to indicate emphasis and subordination
- Internal headings (labels) easy to scan from top to bottom of page

Keyword Format

What we call the keyword layout uses the first of our two basic page formats. It is suited to Information Mapping style because it provides a column for labels to the left of the blocks of text.

Figure 3 shows the chapter opening style and a two-page spread of typical pages. The left column on the grid is used mainly for display of key words. The text is on the right, covering the other two main columns

Figure 3. Keyword format. Chapter opening (left) and typical continuation pages (right).



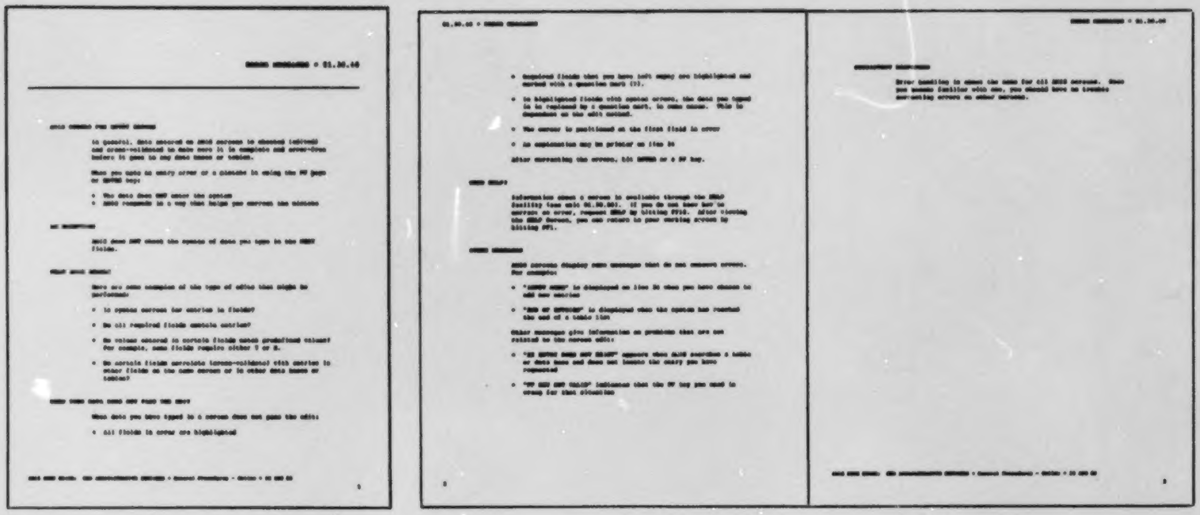


Figure 4. Alternative format.

of the grid. Tables and illustrations can be kept in the text area or can run from margin to margin if more width is needed.

Alternative Format

The second basic page style has the text block indented under flush left headings (see Figure 4). Here, too, tables and illustrations are kept in the text area and extended to other points on the grid only if more width is needed.

EVALUATION

We had to accept some compromises in developing our new formats. We were unable to follow all the points suggested by research. We could not use proportional type. The line in our second format is longer than the optimum for reading ease. Line spacing is more inflexible and too close, and we need more typeface variety for headings and emphasis.

However, we like the more distinctive unit openings, the clarity of labeling, the subordination of control information, and the cleaner look of the pages. Our clients are pleased, too.

SUMMARY

I have described the strategy we used in modifying the basic page design for computer system documents in our large organization. Changes were needed to make computer documentation easier to read. The new design standard had to be accepted by a working community of computer system users, computer services managers, technical writers, and text entry specialists.

Within strict cost limits in a mainframe computer environment, we developed a set of two basic page formats through research, trial design, review, and revision.

We used an underlying grid structure to design and demonstrate the formats. The new design features a modern asymmetrical style, visually subdued control information, and structural support for information mapping.

Acceptance was gained through a group design process leading to consensus, and by making minor adjustments after a survey of managers and users.

We have taken a big step toward that ideal of guiding the reader through the jungle of technical information.

Providing Technical Photos on Short Notice

Bob Astra (deceased)

Robert Astra
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Medford, Massachusetts 02155

Have you ever wanted to illustrate a "crash deadline" data sheet, manual, or paper with a a Polaroid photograph, then discovered that you couldn't get close enough to see the product with the camera you had?

That's probably when you wished you could use the close-up lens of a 35mm camera, but you didn't have time to develop the film and make the prints.

Don't despair. Polaroid has made it possible for you to use any 35mm camera that can be loaded with conventional film and come up with B&W or color slides within a minute or two from the time you remove the exposed film from the camera. And you can make enlarged prints from those slides within minutes.

Polaroid's **Autoprocessor 35 System** includes a selection of three films and matching processing cartridges as follows:

- Color transparency, film speed 40.
- B&W continuous tone, speed 125.
- B&W high-contrast, speed 400, used primarily for graphic slides.

The Autoprocessor is a 4x4x9-in. manually operated "box". When your film is ready to be processed, you simply open the processor cover, drop in the processing cartridge, and place its leader strip onto a takeup spool near the processor's front.

The film is similarly positioned in the processor and its leader placed on the take-up spool. (Incidentally, if you inadvertently rewind your film leader back into the film cartridge before you remove it from the camera, Polaroid provides a gadget that slips into the film slot in the cartridge to hook onto a hole in the leader and fish it out). Now, close the spool and processor covers. Turning a lever opens the developer cartridge and starts the flow of processing fluid. After a five-second wait, you turn a crank and wait 60 seconds. Rewind the crank and open the processor cover. VOILA! The developed film can now be pulled out and viewed.

Next, wind the film back into the cartridge and use the system's cutter/mounter to finish the job by cutting and mounting the processed film in Polaroid Side Mounts.

It's also fairly simple to print illustrations from 35mm transparencies by using either the 3-1/4 x 4-1/4 or 8 x 10 model of Polaprinter. Place the slide in the viewer to determine the best cropping. This is necessary because a slide has a 1 x 1.5 format, while a Polaroid pack film image (or a Polaroid 8 x 10 image at its highest magnification) is approximtely a 1 x 1.3 format. Of course, if you use the lower magnification setup on the 8 x 10 Polaprinter, you can copy virtually the entire slide image on the 8 x 10 print, leaving extra-wide borders on the short side.

The prints from the smaller Polaprinter start developing when the exposed material is pulled from the pack. The larger Polaprinter uses a standard 8 x 10 film holder with individual sheets of film; after exposure, the material is passed through a standard 8 x 10 Polaroid processor.

Films normally used in the smaller-format Polaprinter are Type 669 Polacolor 2 for color prints or Type 665 P/N for B&W prints. Type 667 film may also be used with a neutral density filter for B&W prints that do not need to be coated.

If, when copying B&W slides, you have excessive contrast, you may want to try printing on Type 669 Polacolor color film. Your results will be a warm-toned B&W print with very good contrast.

Only two types of film are currently available for use with the 8 x 10 Polaprinter. Type 809 is a Polacolor 2-color print film with an emulsion very similar to that of Type 669. Type 891 Colorgraph film produces a transparency normally suited for overhead projection.

The Changing Role of the Visual Communicator

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In the first step of this study technical illustrators who had graduated from the Purdue University Industrial Illustration Technology (IIT) program were asked about their job placement and job preparation. The second aspect was a Delphi study utilizing a 21 member panel of technical illustration experts. Respondents were asked to rate 164 illustration competencies and then rank the six skill categories they felt would be the most important. The respondents indicated that computer graphics, pictorial drawing, basic drafting and communication skills were the four most important entry level skill categories that would be needed in 1989.

The field of technology is changing at an ever-increasing rate. Skills and knowledges that were valued by the technical illustrator's prospective employer five years ago will differ from those sought today. The student who is currently contemplating a career in technical illustration will not enter the work force for two to five years. The competencies that are valued in 1984 may not be those needed in 1989.

The main goal of any education program is to prepare students to enter the work force. Technical illustration at Purdue University is no exception. Industrial Illustration Technology (IIT) at Purdue is a two-year associate degree program. This program was initiated in 1963 and currently has approximately 100 students enrolled annually. The curriculum was designed to prepare students for a career as a technical illustrator or technical artist.

The purpose of this study was to determine how advances in technology have changed the role of the technical illustrator. The data collected will be used for revising and upgrading the Purdue IIT program.

The first stage of this two-part study was in the form of a mailed questionnaire to all graduates of the Purdue IIT program. The purpose of this stage was to collect historic data concerning skills most used and valued by technical illustrators.

The second stage was a Delphi survey. This was accomplished by two rounds of mailed opinionnaires to a panel of respondents considered experts in the field of technical illustration. The purpose of this stage was to determine future entry level competencies for the technical illustrator.

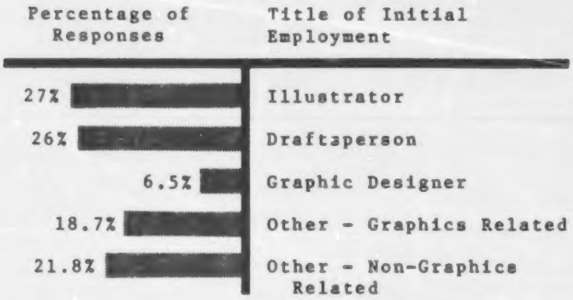
QUESTIONNAIRE

The questionnaire to graduates of the Purdue IIT program gave insight pertaining to historic data including job preparation, job placement and job skills. After developing the questionnaire and field testing on the Purdue Technical Graphics faculty, it was mailed to all IIT graduates. Thirty-seven percent of all graduates responded to the questionnaire.

To determine employment record, IIT graduates were asked to list all positions held since graduation from the IIT program including different positions within the same organization. From this information it was possible to determine initial employment trends for IIT graduates. As seen in Figure 1, fifty-three percent of all graduates' initial employment was either drafting or illustration related. Approximately twenty-five percent were in graphic design and other graphics related positions, i.e., tool design, art direction, landscape architecture, etc. Approximately twenty-two percent were employed in other non-graphics related positions. It was also possible to determine the percentage of those who stayed in their major profession, i.e., illustration or visual communication. Seventy-five percent of the respondents are still employed in the visual communication area. Graduates who had accepted employment in the visual communication area were asked to rate their preparation for the first job after graduation as either not applicable, poor, adequate, or excellent. Figure 2 shows that 80 percent felt they received either adequate or excellent preparation.

Graduates were then asked to list the most important and the least important courses they took in the IIT program. The bar chart in Figure 3 shows that the area in which graduates were initially employed corresponds to the courses they felt were most important. Although twenty-eight percent felt that architecture was one of the most important

FIGURE 1. INITIAL EMPLOYMENT POSITION AFTER GRADUATION



courses, only two percent had architectural related employment.

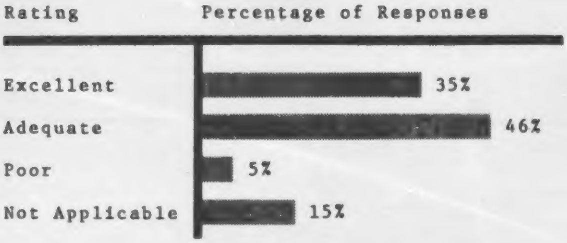
DELPHI

The question addressed by the Delphi portion of this study was, "What entry level competencies will be needed by the technical illustrator in 1989?"

The Delphi method was developed by Rand Corporation employees in the 1960's. It was originally used for future-forecasting in industry and government. The technique has since been applied in other areas including education where it has been used as a curriculum planning tool.

The Delphi does not attempt to predict the future. What it does attempt to do is obtain a consensus of opinions about a future oriented issue. "What the Delphi is, is a really quiet, thoughtful conversation, in which everyone gets a chance to listen. The background noise of small talk, and the recurrent sonic booms of vanity, are eliminated at the onset, and there is time to think." (Thomas, 1980)

FIGURE 2. PREPARATION FOR EMPLOYMENT AFTER GRADUATION



This Delphi utilized a respondent panel of 21 experts in the field of technical illustration. The 21-member panel was divided into four groups: university faculty, industrial technical illustrators, supervisors of technical illustrators, and illustrators in architecture and advertising related fields.

The first round consisted of a collection of competencies from representative panel members. These competencies were arranged into skill areas and placed into 17 categories to form the opinionnaire for the second round. Respondents were asked to rate each competency according to importance and then select the six most important skill area categories and rank those categories. The most important category was assigned a value of six points and the lowest of the six selected categories received one point. Individuals were reminded to respond with respect to the Delphi question. Respondents were also encouraged to write comments and add any competencies they felt were lacking. Figure 4 indicates the relative position of the 17 categories and the cumulative point total of the panel responses.

FIGURE 3. THE MOST IMPORTANT AND LEAST IMPORTANT COURSES IN THE INDUSTRIAL ILLUSTRATION CURRICULUM

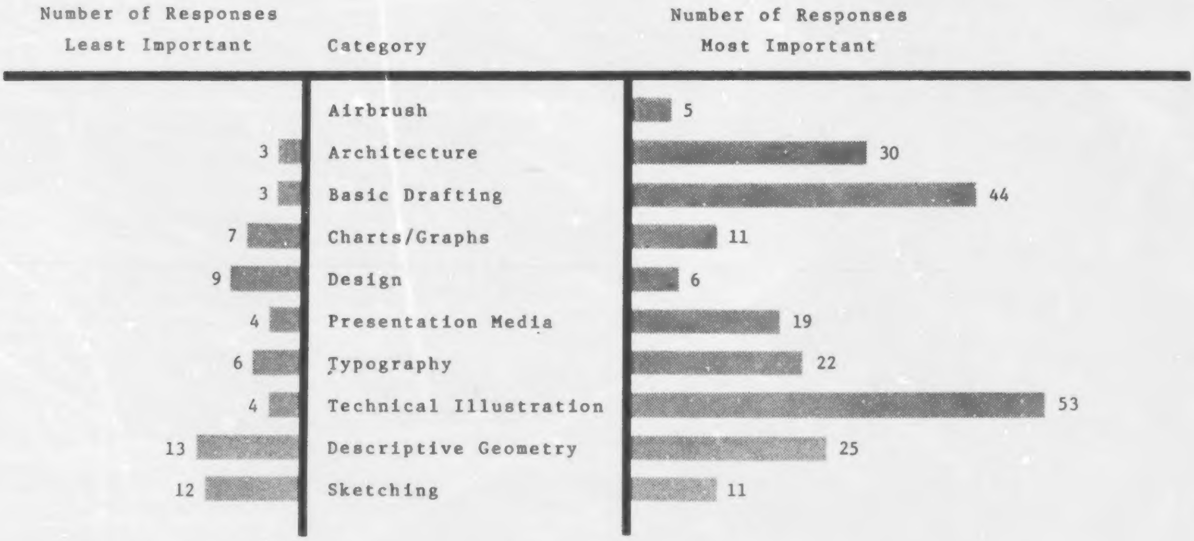


FIGURE 4. RELATIVE POSITION OF SKILL CATEGORIES

Category	Cumulative Point Total
Computer Graphics	57
Pictorial Drawing	54
Communication Skills	54
Basic Drafting	45
Design	37
Presentation	29
Equipment Usage	24
Engineering Drawing	22
Charts and Graphs	17
Media Usage	15
Inking Techniques	15
Engineering Application Drawing	15
Architecture	12
Typography	10
Manufacturing	8
Airbrush	8
Lettering	2

Figure 5 indicates the percentage of panel members who ranked each category as one of the six most important. As shown in Figure 5, Computer Graphics was considered by 70 percent of the panel respondents to be one of the six most important which would be needed at an entry level in 1989. Pictorial drawing was ranked as important by 60 percent of the respondents. Basic drafting and communication skills were ranked as important by 55 percent of the respondents.

FIGURE 5. PERCENTAGE OF RESPONDENTS WHO RANKED INDIVIDUAL CATEGORIES AS ONE OF SIX MOST IMPORTANT

Skill Category	Percentage
Computer Graphics	70
Pictorial Drawing	60
Communication Skills	55
Basic Drafting	55
Presentation Media	50
Design	50
Charts and Graphs	45
Media Usage	45
Equipment Usage	35
Engineering Drawing	30
Inking Techniques	25
Engineering Application Drawing	20
Typography	20
Manufacturing	15
Architecture	10
Airbrush Skills	10
Lettering	5

A comparison of Figure 4 and 5 shows that while computer graphics was ranked the highest of all the categories, pictorial drawing and basic drafting skills held the second and fourth position on both charts. This should indicate to curriculum planners of technical illustration programs that although computer graphics is rapidly gaining popularity and importance in the field, basic drafting skills and the ability to produce pictorial drawings should still receive a major emphasis in any technical illustration program.

CONCLUSIONS

The purpose of this study was to obtain data that could be used for the planning of technical illustration programs. The questionnaire focused on what skills have been important to the illustrator. Results of the questionnaire indicate that 80% felt they had received adequate preparation for their first job in the visual communications area.

The Delphi focused on what entry level competencies will be important to the illustrator in the future. Results from this 21 member panel indicate that although computer graphics is becoming more and more important as an illustrator's tool, basic drafting, the ability to produce pictorial drawings, and communication skills should remain an important part of the technical illustration program.

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Developing Corporate Video

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Abstract

This workshop has a twofold objective. It shows: 1) the number of ways video is used by U.S. corporations to communicate with employees and/or external audiences and 2) the steps you can follow when seeking outside professional video assistance or when developing your corporation's video production department.

Video in U.S. Corporations

Through a videotape presentation and discussion, this workshop shows how corporations are using video as a replacement of or supplement to traditional print (publications, newspapers) and audiovisual (slides and overhead transparencies) formats. The videotape includes samples of corporate video productions such as video annual reports, training courses, seminars, magazines, multi-city conferences, promotional information, and educational courses. A discussion following each video segment covers the advantages and disadvantages of each production, and why and how each corporation is using video to communicate with its audience.

Video's Role in Your Organization

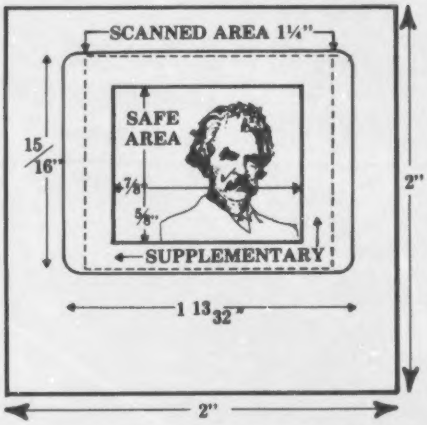
Another videotape presentation, along with handouts and a discussion, introduces the workshop participants to the "Four P's of Video." The "Four P's of Video" are: 1) Planning, 2) Preparation, 3) Production, and 4) Postproduction.

Planning

This segment of the workshop shows the participants the necessary steps in planning a video production. Participants receive insight into how to write a video proposal. The workshop leader goes through the planning steps, one by one. These steps include examining the program idea, conducting research, establishing the need, defining your audience and its needs, assessing equipment, personnel, legal, and budget limitations, and examining production elements.

Preparation

After the proposal is approved by the corporate executives and they guarantee 100 percent commitment to the project, video preparation begins. This segment covers the role of the producer, director, writer, artist, and other personnel involved. In addition, guidelines for writing the script, designing graphics, and directing your talent will be included.



Preparation. Guidelines for preparing slides for a video screen.

Production

In this segment, guidelines are given on delivering your message, decorating the studio or field location, lighting your talent and location, conducting a rehearsal, using camera angles and special effects, solving unexpected problems, and producing quality audio.

Postproduction

This segment defines postproduction activities which include video editing, inserting graphics and audio. In addition, participants will learn effective ways in communicating with video editors. Ways of distributing the videotapes will also be discussed.

Using A Team Approach for Better Documentation

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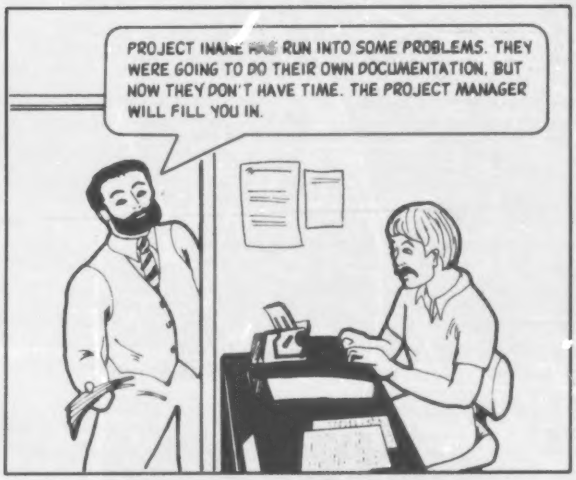
ABSTRACT

This paper presents our perception of the publication work flow today, recommends an integrated team approach, and gives an example of the team approach in use currently at Sanders. At large companies, most artists do not even know the names of the writers for whom they illustrate. They may not know the engineers whose product they are illustrating at all. Most writers know only the art supervisor, if they know anyone in the illustration group. Yet the artist and writer, together with representatives from engineering, logistics, editing and composition, provisioning, and training are expected to create technically accurate, consistent, high-quality,, aesthetically pleasing documents. We believe the team approach leads to higher quality, more accurate documents, more satisfied document producers, and more satisfied document users—and the Sanders approach proves this to be true!

TYPICAL DOCUMENT WORK FLOW—AN EXAMPLE OF CRISIS MANAGEMENT

As the figure shows, documentation projects frequently begin at the end of an engineering project—when the engineers realize they won't have time to write the documentation required.

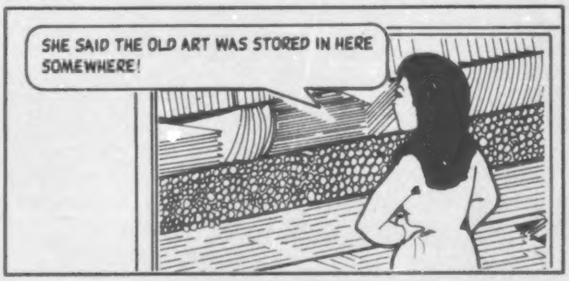

PROJECT INAME HAS RUN INTO SOME PROBLEMS. THEY WERE GOING TO DO THEIR OWN DOCUMENTATION, BUT NOW THEY DON'T HAVE TIME. THE PROJECT MANAGER WILL FILL YOU IN.

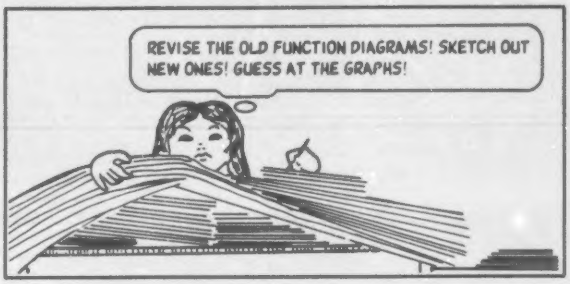
This is a good example of crisis management: waiting until the project is in a crisis to solve problems that might have been foreseen.

The results of beginning the documentation at the end of a project? Workers motivated by a looming deadline do "the best they can under the circumstances". Since a project in trouble is usually experiencing more than one problem (such as lack of source documentation), support—key to the team approach—is frequently not available. The final result? Unclear documentation.

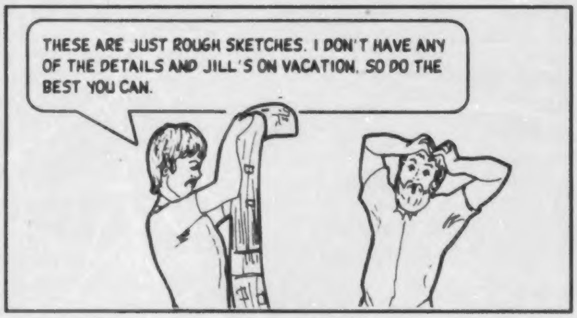
Due to lack of time and planning, the entire documentation effort is done piecemeal. No one knew the project would exist, so no writer, artist, or editor was scheduled for it. A team has not been assembled, and it may be impossible to assemble one "on the spot."

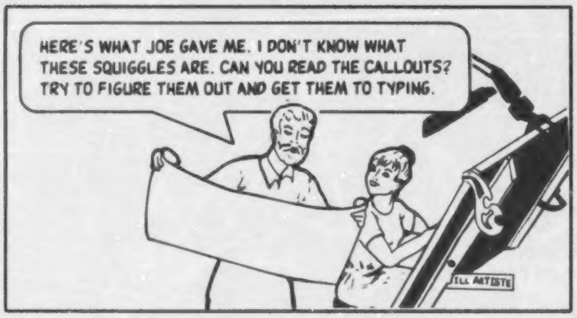
The following illustrations show a writer's common problems when the writer has little knowledge of the project and no support group.


SHE SAID THE OLD ART WAS STORED IN HERE SOMEWHERE!


REVISE THE OLD FUNCTION DIAGRAMS! SKETCH OUT NEW ONES! GUESS AT THE GRAPHS!

Traditional procedures may separate the people working on a document from each other. The following illustrations show what can happen when "standard procedure" is to work up and down the hierarchy.


THESE ARE JUST ROUGH SKETCHES. I DON'T HAVE ANY OF THE DETAILS AND JILL'S ON VACATION. SO DO THE BEST YOU CAN.


HERE'S WHAT JOE GAVE ME. I DON'T KNOW WHAT THESE SQUIGGLES ARE. CAN YOU READ THE CALLOUTS? TRY TO FIGURE THEM OUT AND GET THEM TO TYPING.
ILL ARTISTE

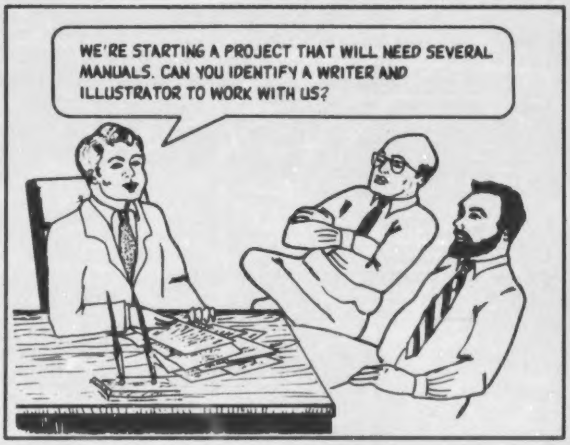
Is this familiar? Unfortunately, it probably is to many of you. The project, at crisis point, is passed to the writing department. It travels from manager, to lead writer, to writer. The writer, frequently without technical assistance, works from internal or outdated external documentation, making quick decisions on necessary art. Writer tells lead writer that illustrations are needed; lead writer tells art supervisor; art supervisor assigns and instructs artist. By the time the mazes are mapped, it is deadline time. The editor may not even know the project exists until the art and text (possibly separately) appear at his desk. What will the "finished" document look like? Only the printer knows for sure.

The Team Approach—Planning and Cooperation at Work

Is there a better way? We suggest a team approach. This requires advance planning and direct contact among the people doing the actual work on a document. The documentation team must be formed at the beginning of the project. Writers, artists, engineers, editors, and other support people then work together to design and implement the document.

ADVANCE PLANNING

Advance planning at the management level is necessary to form a committed team. A team whose time is dedicated to producing clear, usable documentation for the project.


WE'RE STARTING A PROJECT THAT WILL NEED SEVERAL MANUALS. CAN YOU IDENTIFY A WRITER AND ILLUSTRATOR TO WORK WITH US?

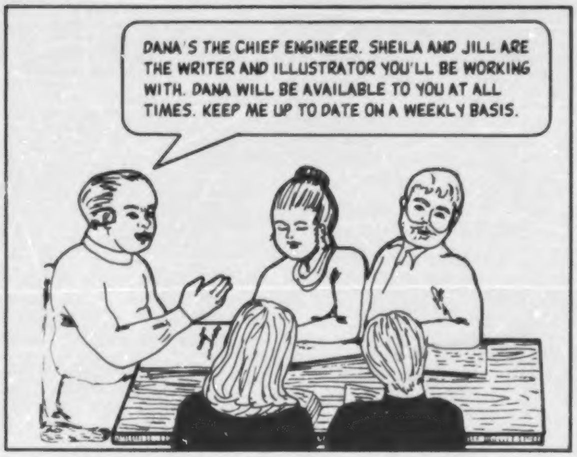
The table below shows a breakdown of the documentation effort into separate tasks and indicates the team members who participate in each task. Key team members are the writer, artist, and editor. (Note that other team members shown in the table provide important support roles, but these are not discussed in this paper.)

Effort	Technical Writing	Training	Maint Eng	Logistics	Provisioning	Editing and Composition	Illustrating
Task Analysis	X	O	O	O	O		
Module Design	X	O	O			O	O
Page Layout	O					O	X
Typography	O					X	O
Sketches	O					O	X
Final Artwork	O					O	X
Validation/Verification	X	O	O	O			
Repro Production	O					O	X
Printing and Negatives	O					X	

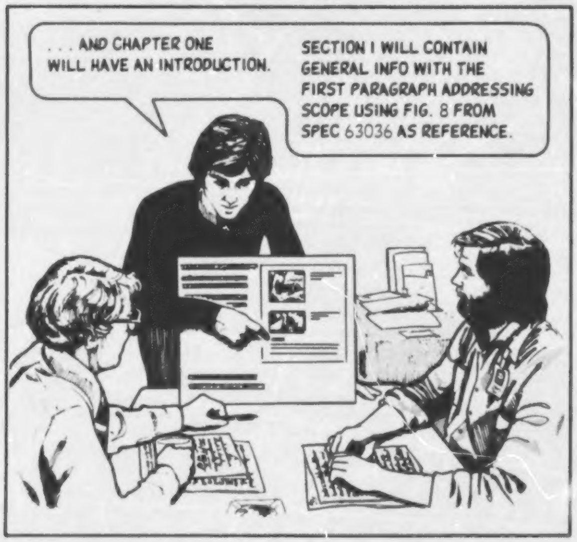
X = Prime Role   O = Support Role

FREQUENT TEAM MEETINGS

Once assembled, team members meet to define the project and their roles in it, as shown below.


DANA'S THE CHIEF ENGINEER. SHEILA AND JILL ARE THE WRITER AND ILLUSTRATOR YOU'LL BE WORKING WITH. DANA WILL BE AVAILABLE TO YOU AT ALL TIMES. KEEP ME UP TO DATE ON A WEEKLY BASIS.

The next figure shows the writer, artist, and editor defining the content of the document.

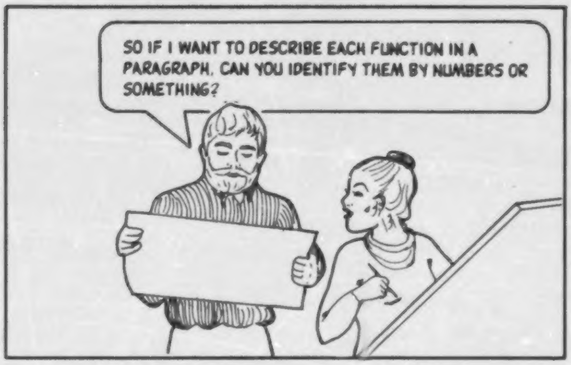

. . . AND CHAPTER ONE WILL HAVE AN INTRODUCTION.
SECTION I WILL CONTAIN GENERAL INFO WITH THE FIRST PARAGRAPH ADDRESSING SCOPE USING FIG. 8 FROM SPEC 63036 AS REFERENCE.

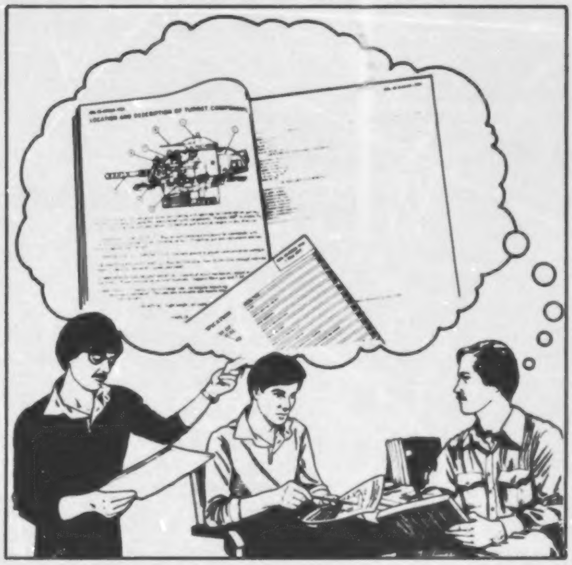
FORMAL MEETINGS

At frequent intervals, formal meetings are held with various subsets of the team. The writer and artist are focal points for almost all of these. As the document approaches production, the editor plays a larger role.

INFORMAL MEETINGS

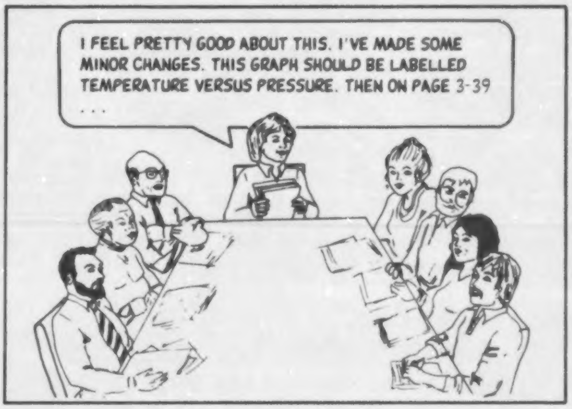
Informal meetings are also important. Team members feel free to ask other team members to look over their work, make suggestions, and mesh their efforts to produce "the best possible" document rather than "the best we can under the circumstances". The following figures show some of these interactions.


SO IF I WANT TO DESCRIBE EACH FUNCTION IN A PARAGRAPH, CAN YOU IDENTIFY THEM BY NUMBERS OR SOMETHING?

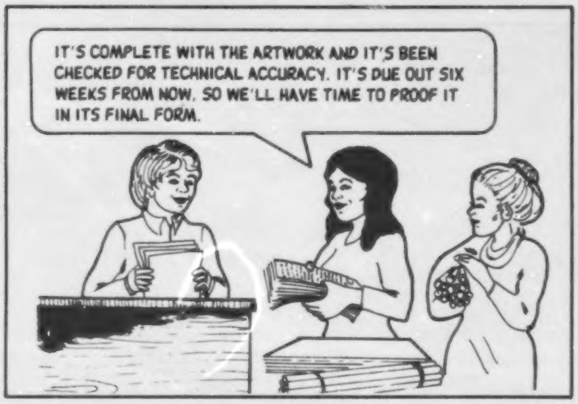


FINAL REVIEW

When the final review of the document occurs, the writer isn't looking at a group of strangers seated around the table. The members of the team that produced the document, including the artist and editor, now review their work. The reviewers know one another and the document, which leads to an honest and thorough critique as shown below.

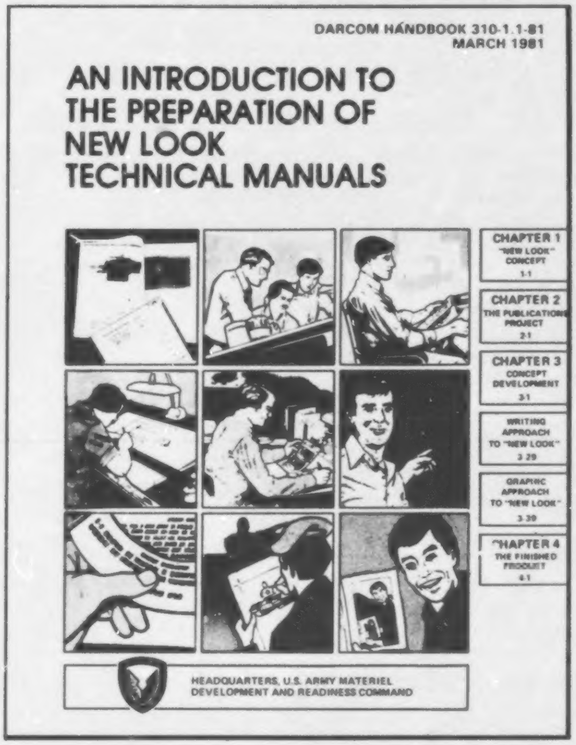

I FEEL PRETTY GOOD ABOUT THIS. I'VE MADE SOME MINOR CHANGES. THIS GRAPH SHOULD BE LABELLED TEMPERATURE VERSUS PRESSURE. THEN ON PAGE 3-39 . . .

The editor, artist, and writer go over the review comments, and make the necessary changes. When the document is ready for final production, the team is satisfied it has done "the best possible" job and has the time to see the document through the production cycle as illustrated below.


IT'S COMPLETE WITH THE ARTWORK AND IT'S BEEN CHECKED FOR TECHNICAL ACCURACY. IT'S DUE OUT SIX WEEKS FROM NOW, SO WE'LL HAVE TIME TO PROOF IT IN ITS FINAL FORM.

THE TEAM APPROACH IN ACTION

Perhaps you think we are asking for too much at once. It is true that some of what we suggest is up to company, or at least department, awareness. But much of the teaming can be achieved by individual writers and artists introducing themselves to each other and working together informally. Wherever possible, bring the engineer and the editor into the group. Unofficially and informally, much of what we've suggested can be achieved. Officially and formally, these practices can become procedures through visible and effective use. We've seen this at Sanders—and our customers heartily approve of the results.



DARCOM HANDBOOK 310-1.1-81
MARCH 1981

AN INTRODUCTION TO
THE PREPARATION OF
NEW LOOK
TECHNICAL MANUALS

CHAPTER 1
"NEW LOOK"
CONCEPT
1-1

CHAPTER 2
THE PUBLICATIONS
PROJECT
2-1

CHAPTER 3
CONCEPT
DEVELOPMENT
3-1

WRITING
APPROACH
TO "NEW LOOK"
3-29

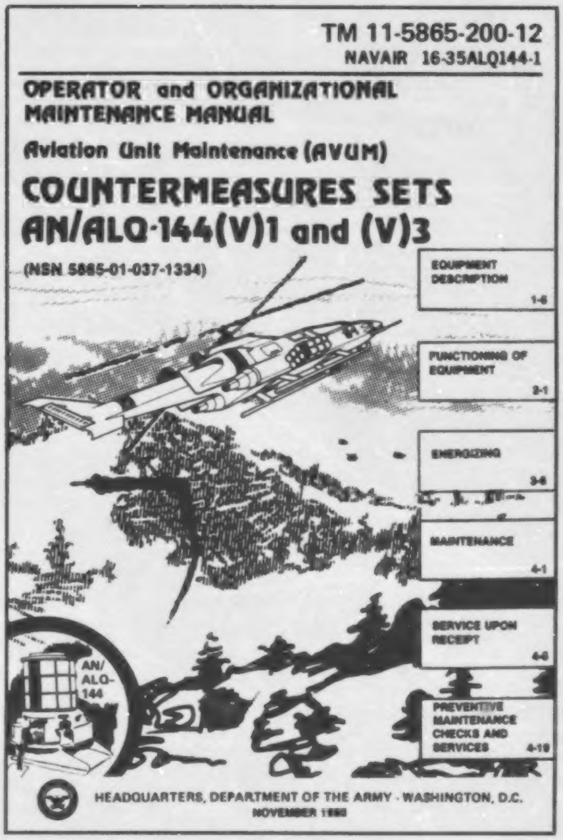
GRAPHIC
APPROACH
TO "NEW LOOK"
3-39

CHAPTER 4
THE FINISHED
PRODUCT
4-1

HEADQUARTERS, U.S. ARMY MATERIEL
DEVELOPMENT AND READINESS COMMAND

Sanders Associates Skill Performance Aids group uses this team approach to produce New Look books. These books are easy to use, contain only the information needed by the target audience, and have a modular format with integrated text and graphics. The cover of the New Look Handbook, developed by Sanders for the Department of the Army Materiel Development and Readiness Command (DARCOM), gives a view of the Skill Performance Aids concept.

In actual practice, we have found the team approach to be cost-effective in producing accurate, useful documents like the manual shown below.



TM 11-5865-200-12
NAVAIR 16-35ALQ144-1

OPERATOR and ORGANIZATIONAL
MAINTENANCE MANUAL

Aviation Unit Maintenance (AVUM)

COUNTERMEASURES SETS
AN/ALQ-144(V)1 and (V)3

(NSN 5865-01-037-1334)

EQUIPMENT
DESCRIPTION
1-6

FUNCTIONING OF
EQUIPMENT
2-1

ENERGIZING
3-6

MAINTENANCE
4-1

SERVICE UPON
RECEIPT
4-6

PREVENTIVE
MAINTENANCE
CHECKS AND
SERVICES 4-19

HEADQUARTERS, DEPARTMENT OF THE ARMY · WASHINGTON, D.C.
NOVEMBER [illegible]

The results? The satisfied customer.

Page Design/Manual Design

Patricia Caernarven-Smith

Patricia Caernarven-Smith
Firman Technical
Publications, Inc.
VP Marketing & Sales
95 Church Street
Pembroke, MA 02359
(617) 826-5148

WHAT THIS WORKSHOP IS ABOUT

The relationship between a user and a product's documentation is a series of transactions. Unless a document is either attractive or urgently needed its user never opens it. Once the user opens it, the information must be attractively presented, as well as being accurate and complete, or the audience again closes the documentation and seeks other ways to get needed information. And this argument holds for "electronic pages," that is, on-line training and documentation, as well.

In the face of these facts, it is nevertheless true that much technical documentation is very hard to read, makes poor use of typesetting and color, crams information onto the page, and forces the user to rely on the manufacturer, distributor, or fellow workers for real information. How can it be better designed? How can technical writers, editors, and marketing specialists design effective, easy-to-use documentation? How can these professionals make intelligent use of typesetting, color, and other devices to make manuals useful and readable?

This workshop focuses on the answers to these questions. This workshop presents the paper or electronic page as the basic element of design for documentation. It presents the elements that combine to make a page. It also shows the interplay among these elements to create an attractive, useful page or a confused, distracting, and useless page of information.

This workshop also presents some basic information about how humans learn and use information, linking that information to the ways in which good page design makes learning easy for the user. Without becoming embroiled in conflicting test results (and there have been many over the years) this workshop presents basic information which helps attendees create well designed pages.

Finally, this workshop includes the elements of testing, to determine the effectiveness of a particular design and its applicability to a particular audience, product, and use.

WHO SHOULD ATTEND THIS WORKSHOP

This workshop is aimed at technical writers and editors - that is, the people who control the contents of publications, and who should be controlling the presentation of the information also.

THE STRUCTURE OF THE WORKSHOP

This is a hands-on workshop. All attendees will be using paper, paste, and simple tools to develop their own page designs. One element that makes this workshop so effective is that the attendees gain a theoretical basis for believing what their eyes quickly learn, that good design results in pages that are easy to look at and decipher. They have a chance to begin with design beliefs they have held or to use mandated corporate policy for page design in a number of experimental ways, and then test the effectiveness of these alternatives.

Once they have designed actual pages, they then have a chance to develop chapter and book designs and to test the legitimacy of their designs rigorously. A successful page design is not only an attractive design but one that can be extended to use throughout a document without severe changes between chapters.

Following testing and book design, they will develop a set of design specifications that can be given to illustrators, typesetting operators, and paste-up personnel for development of actual books.

Documentation Design: Product Consum(er)ability Graphics/Design in Effective Documentation and Training Materials

Elizabeth Heitzmann and Suzanne Watzman

Elizabeth Heitzmann

Suzanne Watzman

Watzman/Heitzmann Design Associates
222 Third Street
Cambridge, Massachusetts 02142
(617) 868-8110

Documentation

doc·u·men·ta·tion \ˌdäk-yə-mən-ˈtā-shən, -ˌmen-\ *n* **1** : the act or an instance of furnishing or authenticating with documents documentary evidence **3** : the assembling, coding, and disseminating of recorded knowledge treated as an integral procedure

in·ter·face \ˈint-ər-ˌfās\ *n* **1** : a surface forming a common boundary of two bodies, spaces, or phases **2 a** : the place at which independent systems meet and act upon or communicate with each other **b** : the means by which interaction or communication is effected at an interface — **in·ter·fa·cial** \ˌint-ər-ˈfā-shəl\ *adj*

Product

prod·uct (prŏd′əkt, -ŭkt), *n.* **1.** a thing produced by any action or operation, or by labor; an effect or result. **2.** something produced; a thing produced by nature or by a natural process. **3.** *Chem.* a substance obtained from another substance through chemical change. **4.** *Math.* the result obtained by multiplying two or more quantities together. [ME, t. L: s. *prōductum,* neut. pp., (thing) produced]

Consumerability

con·sum·er (kən so͞o′mər), *n.* **1.** one who or that which consumes. **2.** *Econ.* one who uses up a commodity or service (opposed to *producer*).

a·bil·i·ty (ə bĭl′ə tĭ), *n., pl.* -ties. **1.** power or capacity to do or act in any relation. **2.** competence in any occupation or field of action, from the possession of capacity, skill, means, or other qualification. **3.** (*pl.*) talents; mental gifts or endowments. [ME (*h*)*abilite,* t. F, t. L: m.s. *habilitas;* r. ME *ablete,* t. OF]

Design

out, or prepare a design — **de·sign·er** *n*

²**design** *n* **1** : a mental project or scheme in which means to an end are laid down **2 a** : a particular purpose held in view by an individual or group **b** : deliberate purposive planning **3 a** : a deliberate undercover project or scheme : PLOT **b** *pl* : aggressive or evil intent — used with *on* or *against* **4** : a preliminary sketch or outline showing the main features of something to be executed : DELINEATION **5** : an underlying scheme that governs functioning, developing, or unfolding : PATTERN, MOTIF **6** : the arrangement of elements that make up a work of art, a machine, or other man-made object **7** : a decorative pattern **syn** see INTENTION, PLAN

1 What is Product Consum(er)ability?

access
useability
ergonomics
user-oriented DESIGN
information-oriented DESIGN
the ability for the product to be consumed by the consumer.

2 How does it happen?

by DESIGN
DESIGN is the bridge between the product and the user

3 What does it mean?

answering real needs
making it really work
function
getting the product off the shelf into use:
- effectively
- efficiently
- successfully

The product fits the user.
The user doesn't have to conform to fit the product.

4 The long range benefits:

the users can get beyond the product and get their job done.
competitive edge
sales/the marketplace
customer support is easier
the needs/requirements/expectations of the new user

5 DESIGN and the Designer:

planning
organization
looking at the environment:
- the use
- the user

looking at the product
looking at the marketplace

● DESIGN macro level:
overall organization
structure
dividing the information
levels
media choice (online, print)
inter-relationship
- function
- content

● DESIGN micro level:
clear visual format
page layout
visual cues, type, etc.

● Accurate and well-written documentation can be buried by the lack of a corresponding visual structure.

A good product can be undermined by the design of the documentation. ●

Product consumerability the macro view

product manager

marketing

writers

customer support

designer

1 What do the users NEED?

what kind of information?

how should it be structured?

how much? how little?

how should it be packaged?

2 What FORM should it take?

print
online
tutorial
help
quick reference

3 CONTENT & SEQUENCE:
What are the important pieces?
(of the product?
of the documentation?)

getting started
first 15 minutes
first hour
first couple of weeks
advanced features
customizing
integrating
review/refresh

● The New User:
non-technical
executive, secretary, banker...
immediate feedback
up-and-running
QUICKLY
network
access to more
information
demands greater flexibility
demands more user-friendly
interfaces

▶ Information about the Product

▶ Information about the User(s)

● The Product
- product structure
- map, diagram
- integration of elements
- non-linear
- orientation
- power v. complexity
- ease-of-use

features
central concept
and use
benefits
image

- use environment?
- how will it be used?
- what is needed?
  1st?
  2nd?
  startup?
  reference?
  advanced?

Documentation

▶ It ain't what it used to be.

● It's not just printer 3-ring binders.
It's print + online....
It's startup + tutorial + concept overview
+ help + quick reference + advanced topics + . . .

● It's different.
And it's got to look & function DIFFERENTLY.

the
micro
view

Consumerable documentation

Less is more......
consumable.

Readability vs. Legibility

→ you can lead a person to the manual,
but you can't make them read...
OR
← how can you read it it you can't find it?

Q What does Design do ? ? ?
(What do graphic designers do?)

A The appearance of EASE-OF-USE:

Design ▶ ▶ HELPS

structure
organization
clarity
hierarchy
accessibility
usability

of technical documentation.

white space
typeface
letterspacing
word spacing
line spacing
line length
justified versus
rag text

Framework approach:
- providing a quick overview:
all the parts and how they
fit together
- a structure they can fill in
& e x p a n d later
- make it VISUAL
- layering information
- more reasons for maps & diagrams

What makes it bad?
- confusion
- where to start
- unclear hierarchy
- can't find what you need
- greyness, everything looks the same
- hard to read

What makes it good?
- uncluttered page design
- use of a grid
- clear headers, hierarchy
- information differentiated
- sequences clearly broken out
- directional cues
- summaries
- consistant visual language
- diagrams, charts, tables

People don't like to read.
less words
more visuals, examples
non-linear use
- graphics/visual cues
- diagrams
- maps
- SIGNAGE
ORIENTATION
GUIDE
GETTING THERE
ALTERNATE ROUTE

Does the documentation reflect the product?
- is it appropriate to the actual use?
- does it support the user in the most effective way?
- image/style

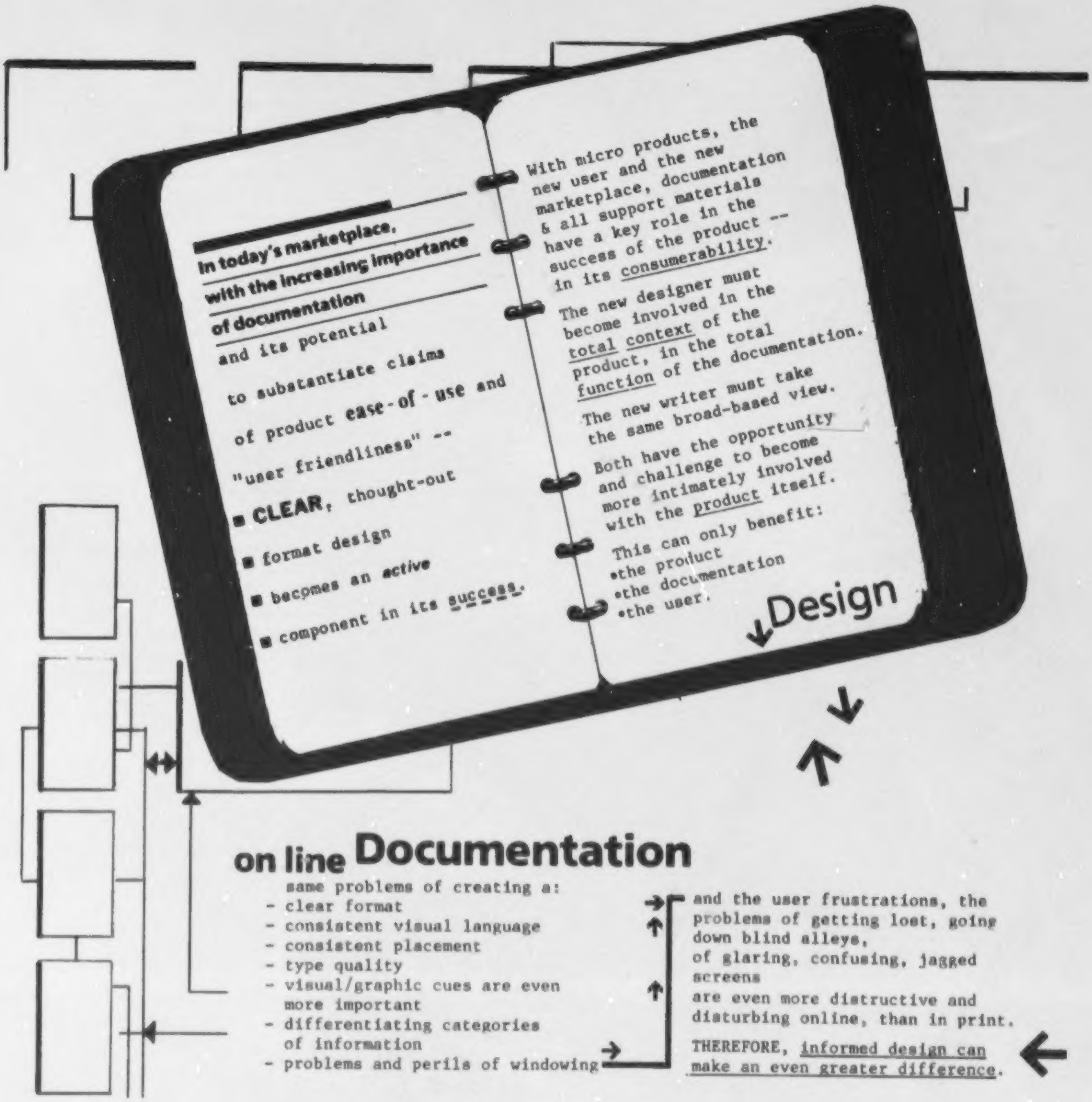
Putting it all together

the universe

Documentation—An Integral Part of the Product

→ With technology changing so fast, documentation is an even more critical part of the total product package. The ergonomic factors that go into user manuals can help sell a product—and, sell its users. If documents are well-designed for ease-of-use, fast referencing and visual clarity, the vendor creates and consistently reinforces an image of expertise and responsiveness.

Documentation is the direct interface between the user and the tool. It must be designed with the same awareness of user, use and environment as are the physical and logical tools it supports. It must be attractive, clear, consistent and cost-effective.



In today's marketplace, with the increasing importance of documentation

and its potential to substantiate claims of product ease-of-use and "user friendliness" --

- **CLEAR**, thought-out
- format design
- becomes an *active*
- component in its success.

With micro products, the new user and the new marketplace, documentation & all support materials have a key role in the product -- success of the product in its consumerability.

The new designer must become involved in the total context of the product, in the total function of the documentation.

The new writer must take the same broad-based view.

Both have the opportunity and challenge to become more intimately involved with the product itself.

This can only benefit:
•the product
•the documentation
•the user.

on line Documentation

same problems of creating a:
- clear format
- consistent visual language
- consistent placement
- type quality
- visual/graphic cues are even more important
- differentiating categories of information
- problems and perils of windowing

and the user frustrations, the problems of getting lost, going down blind alleys, of glaring, confusing, jagged screens are even more distructive and disturbing online, than in print.

THEREFORE, informed design can make an even greater difference.

An Integrated Approach Can Enhance the Live-Performance Presentation

Larry Gottlieb, Moderator

For too long, the world of technical communicators has haphazardly supported a significant communication category: the live-performance presentation. Yes, occasional books have been published, articles written, presenters helped. But there is no evidence that any publications organization has devoted its full resources to strengthening the oral presentation skills of scientists and engineers, its major clients.

At the Livermore Lab, we're aware of an enormous need to improve presentation quality. And, in our Editorial Division, we've taken some early, organized steps to help turn around the mediocrity of technical presentations. Our approach, in a sense, has been double-integrated. Certain of our editors are now looking at more than the written aspects of a presentation. When they help a scientist or engineer, they also focus on the visual and the oral. They give all three elements equal weight, in an integrated manner. Another integration occasionally takes place. Our editors work closely with other experts (e.g., artists) during creative conferences with clients. The results have been gratifying, not only to us but to those we help.

This panel will report some of the work we have done. I will begin the session with a philosophical overview of our approach. In particular, I will mention how a new breed of technical communicator has evolved. This presentationist integrates the tasks of traditional helpers: publications editors, artists, speech and drama teachers. For example, this person begins with the basic concept (often in written form), translates it into its visual analog, then coaches a presenter in ways to orally discuss the written/visual blend.

The second panelist, Marilyn Kamelgarn, will describe the detailed and practical aspects of working with presenters. She will cite the process and techniques she uses when helping someone prepare a presentation. Her emphasis will be on the working conference and the rehearsal. To her, the conference has been an opportunity to bring about new and fruitful interactions among the client, the artist, and the editor. It is an exciting collaborative activity. During this conference, she has adapted the animator's technique of storyboarding to help develop a powerful organization of ideas. Finally, she'll explain how she guides a client through a rehearsal, or "dry run." During this latter stage, she applies her background in theatre arts to help clients with their speaking skills.

Our last panelist, Mike Genin, will explain how he works with clients on specific visuals. He will take a theoretical look at how an editor can help someone translate written and tabular material into a visual format. Then he will show you how he has put his ideas into practice. He will discuss how, although he is not an artist, it is essential for him to have a visual viewpoint when helping a client on a presentation. His talk will show how words can be turned into pictures; it will also look at such constraints as the time span for a visual on screen and the limits to information density on a visual. Finally, he will explore how he, as a presentation editor, helps clients become better speakers when using their visuals.

In conclusion, we three believe that other technical communicators can benefit from our experience. We hope that the techniques and knowledge we are sharing can be adapted by other publications organizations so they too can help the technical speakers they serve. We know there is a huge, relatively untapped market out there for technical communicators. And, we're sure that the main beneficiaries of our service—scientists and engineers—will advance not only their careers but the quality of the work they're doing.

The Livermore Lab Has Created a New Breed of Technical Communicator*

Larry Gottlieb

Larry Gottlieb
Lawrence Livermore National Laboratory
Presentationist
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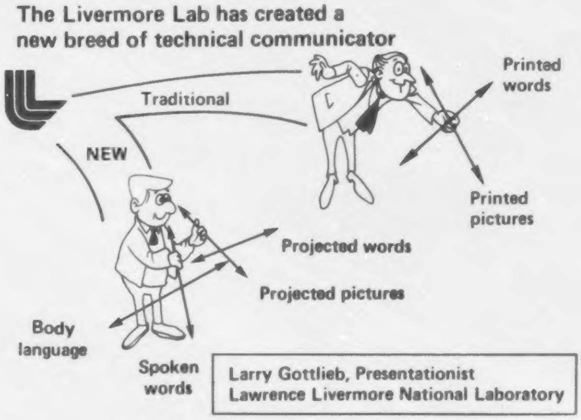
(415) 422-0853

ABSTRACT

The presentationist, Livermore's new type of technical communicator, helps presenters in a uniquely different way. Our approach equally focuses on the visual, oral, and written elements of a presentation. This integrated emphasis helps our scientists and engineers successfully tackle the nightmare of the live-performance presentation. Our new breed supports the presenter from idea inception through art and photo lab production to rehearsal and actual performance. What makes this a new and exciting experience is the emphasis on thinking visually and orally. What can make this a rewarding experience is the ability to meet the needs of a huge new market for technical communicators.

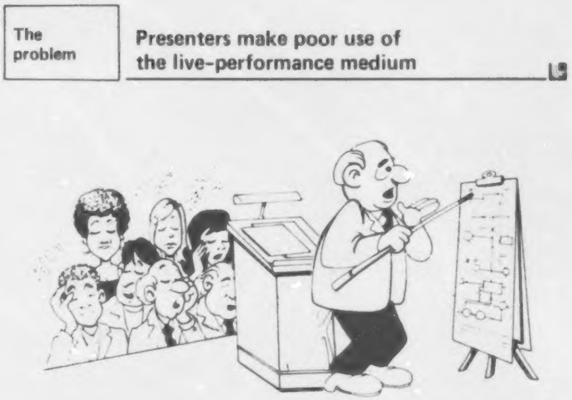

The Livermore Lab has created a new breed of technical communicator
Traditional
NEW
Printed words
Printed pictures
Projected words
Projected pictures
Body language
Spoken words
Larry Gottlieb, Presentationist
Lawrence Livermore National Laboratory

Traditionally, most of our technical communicators have dealt with printed words and pictures. The writers, editors, and artists in our Technical Information Department (TID) have helped create documents: reports, brochures, manuals. Occasionally, they've helped the Lab's scientists and engineers with such static displays as posters and fine art.

In more recent times, we've moved away from the static. TID does have people who regularly produce animated cartoons and slide-sound shows. We also create motion picture and videotape productions. These animators and multimedia producers have been our *only* visual and oral thinkers. But this is no longer true.

Today, we have a new breed of technical communicator. This person also thinks visually and orally. Not for "canned" productions, but for a live-performance medium: the world of technical presentations. This person can be thought of as a new species of helper, as someone who equally focuses on projected words and pictures along with spoken words and body language. The result is a uniquely different way of helping presenters.

Such a "presentationist" has emerged here over the last four years. As technical presentations have noticeably grown in importance at our Lab and as the number of presentations given has jumped to more than 60,000 per year, we've responded to the need for help. This is a huge and rapidly expanding market for technical communicators. And this is a medium wracked with problems one often doesn't face in the world of printed documents.


The problem
Presenters make poor use of the live-performance medium

Thanks to the burgeoning emphasis on effective technical communication, more and more scientists and engineers are better at written communication. We see more campus courses in technical writing and editing. More companies want their people to write and speak better.

Unfortunately, most of these better writers aren't better speakers. They mistakenly think they can effectively transfer printed words and pictures to a live-performance situation. The nightmarish result is too much information viewed, for too short a time. The information quite often can't be seen—either the projected image is too small or the speaker unknowingly blocks the screen. Many speakers ignore their audiences, many other speakers either can't be heard or drone on in monotones.

The effect on an audience is often enervating. Audience members can be seen doodling, chatting with neighbors, yawning, or simply in a deep sleep. In a sense, most technical presentations are more effective than sedatives.

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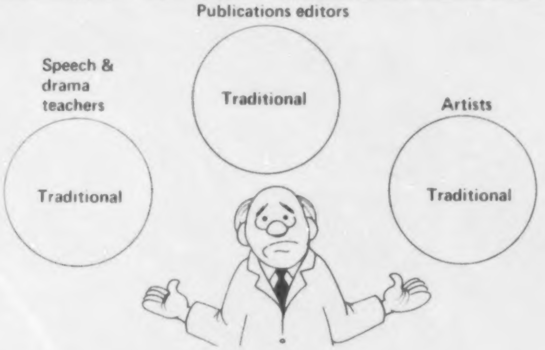
* Work performed under the auspices of the U.S. Department of Energy by the Lawrence Livermore National Laboratory under contract number W-7405-ENG-48.

The traditional solution

Three specialists have separately helped presenters



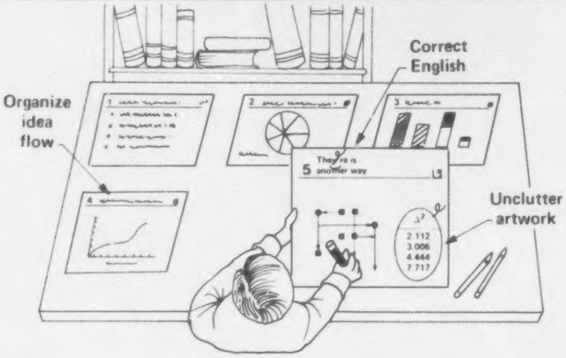
To relieve or eliminate the sedation effect, presenters have typically relied on three helpers:
1. Publications editors.
2. Artists.
3. Speech and drama teachers.

These three, specialists all, have essentially acted as "lone rangers." As a result, the hapless presenter improves in only one, maybe two aspects of this live-performance medium.

The great shame, for example, can be a superb set of words and pictures sabotaged by the presence of a poor speaker. Or, imagine a silver tongue stifled by a hazy, incongruous set of visuals. Yet, let's not knock or ignore these specialists. Anything that can help alleviate the sedation effect is welcome.

The traditional helper

Publications editors have improved presentations several ways



There is nothing new about editors helping presenters. A colleague of mine, for example, edited presentations in the late 1940s. What he did was essentially what other editors have done since then. He applied some basic principles of report editing to the task.

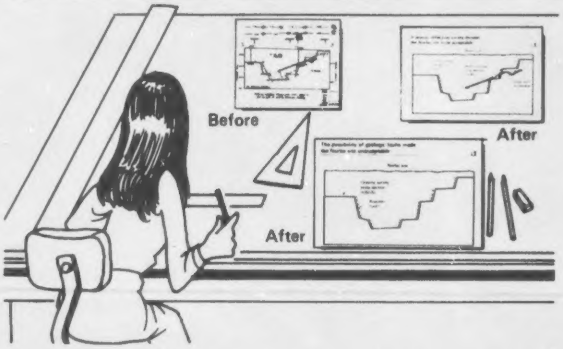
First, he made sure the visuals were well organized. He looked for that inner logic all good documents have: is it a story well told, a story that flows, a story with congruous messages? If not, he created the good beginning or middle or end it needed.

Then he corrected the English. He checked the spelling, the punctuation, the grammar. That is, he built literacy into a set of visuals.

Finally, he helped unclutter the artwork on each visual. He eliminated the nonessential, he clarified the obscure. My friend did what any good editor would do to improve report art.

The traditional helper

Artists have helped redesign and unclutter visuals



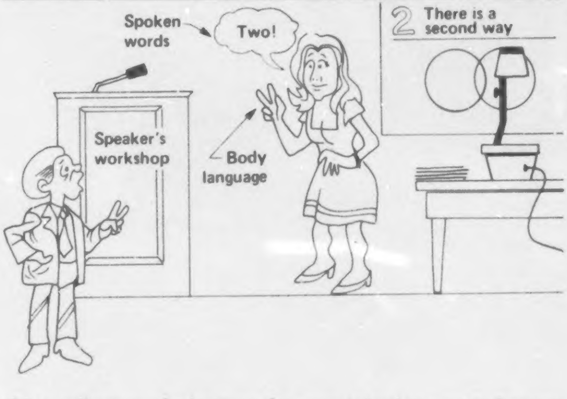
Another colleague of mine, a current TID artist, has a long and successful track record helping presenters with their visuals. He works closely with the presenters, constantly challenging their logic. He looks at the hand-drawn and hand-lettered mess submitted by the presenters. Then he goes about cleaning up their drafts.

Through a stimulating process of interrogation, he helps redesign a poor visual. He improves its composition, suggests effective colors, selects attractive and legible typefaces. He then tackles all that clutter. In a sense, he becomes a surgeon who excises the excess information that had squeezed out all available white space.

My colleague is not alone. Other artists, here at the Livermore Lab and elsewhere, have for years helped improve the look of a presenter's visuals. Some do what any artist would do to improve report art; others, like my colleague, treat the visual as presentation art to be projected during a live performance.

The traditional helper

Speech and drama teachers have coached public speaking skills



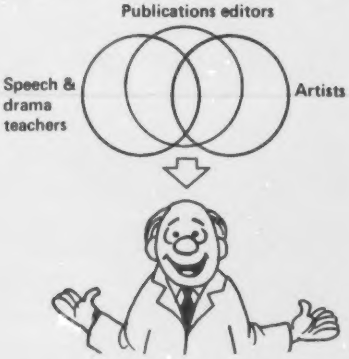
Other colleagues of mine have for years helped presenters become better speakers. They are true lone rangers. Most often, they are speech and drama teachers who moonlight. A company calls them in as consultants. They then work with selected individuals, sometimes on specific speech problems.

When done, they go on to another company. This time they may act as seminar or workshop leaders. They work with small groups of potential presenters, teaching them basic principles of public speaking. These specialists may emphasize meaningful hand gestures coupled with the message seen on screen. Or they may stress a proper "speaker's posture" and constant eye contact with audience members. Others may focus on the vocal: hearable volume, followable speaking rate, interesting inflection.

Many of these experts tell you how to outline your presentation, and some even deal with the pictures you may use. Very few combine the oral, the visual, and the written in a manner that gives equal stress to all three.

The new breed

The presentationist integrates what traditional helpers have done



Our presentationists at Livermore aim for an ultimate goal: integrating the written, visual, and oral. This is not an easy task. It usually requires intense and demanding closed-door interaction with a presenter. These exhausting two- or three-hour sessions are often akin to the creative brainstorming used to develop print ads.

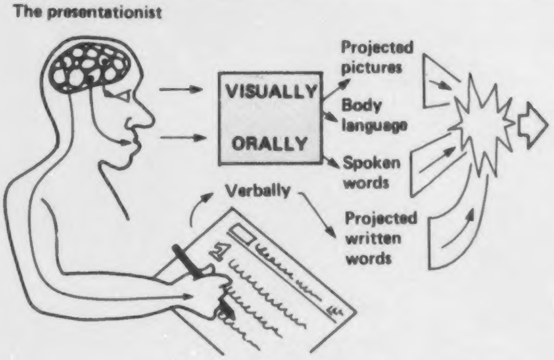
The presentationist doesn't stop after these sessions are completed. Then comes the process of coordinating the visuals through art and photo lab production. Sometimes an accompanying briefing book has to be created and published.

After production, we rehearse the presenters. These practice sessions, sometimes videotaped, are designed to improve a presenter's speaking skills. Even then, our job is not over. We may get to observe the actual presentation. After it, we give speaking skills feedback to the presenter. Thus, we can help assure an even better performance for a future presentation.

"We," by the way, can be more than just a publications editor acting as a presentationist. (We currently have three editors acting as presentationists, one of whom does it full time. Several others occasionally help in the written and visual arenas.) Artists, speech and drama teachers, proofreaders, compositors—all these people can learn to expand their skills and do this new type of work.

The new breed

What's "new" is the emphasis on thinking visually and orally

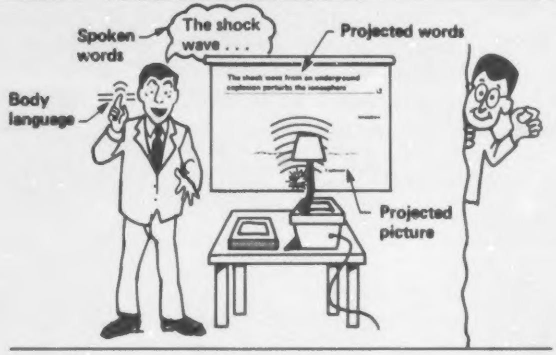


I don't think I can overstress the new blend of *visual* and *oral*. It is crucial to the success of our support at the Livermore Lab. And I certainly don't want to denigrate the importance of the *written* (i.e., the verbal). The message works best if all these elements are equally balanced.

In the past, certain individuals have assuredly been effective visual/oral thinkers. But, we are not aware of any organization that has followed the Livermore path: a structured way to develop visual/oral thinkers. I've seen it happen most dramatically with my own development in the last four years. Prior to that I was a predominantly verbal person. Today I think much more visually; I find it much easier to see pictures rather than words when ideas are expressed to me. Concurrently, I keep myself constantly aware that spoken words and body language (the nonverbal) will also be involved. And never do I lose my appreciation for the written words that will be projected.

The new breed

Presentationists assure that four key modes are congruent



I wrote earlier that a message works best if there's an equal balance of visual, oral, and written elements. Do not be misled. I mean one does more than equally "weight" the importance given each element.

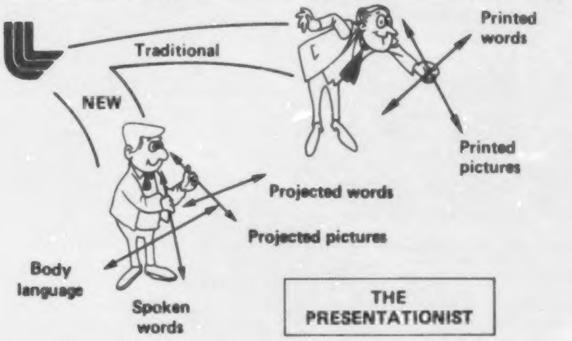
Livermore's approach takes advantage of the concept of multichannel communication. Each channel (or element) contains the same message. The sum total is not a new message, but the *reinforced* learning of the message (which appears in all of the channels).

Our presentationists seek such congruence. For example, if the visual's title has the *projected words* "The shock wave from an underground explosion perturbs the ionosphere," we seek a *projected picture* identical to the written message. This is often called an ideograph or a pictogram. We also have discovered that thematic titles, structured as simple declarative sentences, are the most informative and effective.

We don't stop there in our search for congruence. We encourage presenters to let their first *spoken words* follow a two-step path: restate the title word-for-word, then describe the picture. With short titles and uncluttered pictures, this takes about 15-20 seconds. A remaining 40 or so seconds can be spent ad-libbing about what's on screen.

Finally, congruence is further strengthened when the presenter uses *body language* (especially hand gestures) to demonstrate key picture elements. The final result is a clear message with high impact.

The Livermore Lab has created a new breed of technical communicator



In conclusion, we at Livermore believe that the presentationist is a trailblazer. This person can meet the needs of a huge new market in technical presentations.

As our economy gets more troubled, as R&D funds dip even further, more and more organizations rely on the presentation to get what they want. The oral presentation has grown in importance over the last decade or so. (It may by now be even more important than the written document.) Our Lab's scientists and engineers recognize the presentation's importance. They know that an effective presentation means more money to an organization. They also know it means more money in their pockets—a number of our presenters say the presentation is more a key to their performance evaluation than a published paper.

Presentationists cannot only help presenters look good, they can help their organizations look good. This new breed can foment a revolution in effective technical communication.

How Does a Presentation Editor Help Clients Communicate?*

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Abstract

The goal is effective, timely communication—of ideas, data, research, concepts, proposals. To achieve this goal, the presentation editor combines many traditional skills and works in new ways with clients and artists. I work as a presentation editor at the Lawrence Livermore National Laboratory. My clients are scientists, engineers, and managers.

I describe the process and techniques I use in preparing a presentation, and explain how these bring about new interactions among the client, the artist, and the editor. In the course of these interactions, the lines of professional disciplines are crossed spontaneously, with surprising benefits for all participants.

FIRST WORKING CONFERENCE

In the first working conference on a presentation, the client, the editor, and ideally the artist, work together in a conference room with no telephone for an uninterrupted block of time, often two to four hours. Because the client is working in a medium which is unfamiliar to him or her, the client requests and appreciates very active collaboration from the editor and the artist. The material the client brings to this meeting is usually very rough and incomplete. (For these two reasons, the editor functions much more as a co-author than is usual when preparing manuscripts for publication.) The three participants structure and edit the material, working side by side (Figure 1).

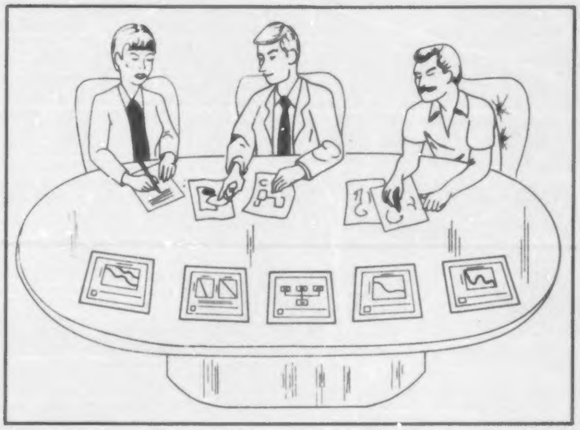
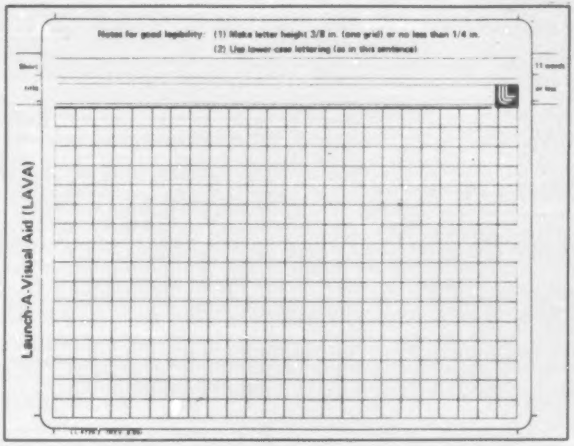


Figure 1. The first working conference: editor, client, and artist.

A great deal of work is accomplished at this conference. First, the client describes the prospective audience and his or her reasons for making the presentation. The client, artist, and editor decide upon a level of detail and technical vocabulary appropriate for the specific audience. They then do a "first cut" organization of the ideas, and they prepare a draft (rough layout) of each visual in a horizontal 8-1/2 inch by 11 inch format (Figure 2). The presentation visual may be a 35-mm slide, an overhead transparency (viewgraph), a poster, a flip chart, stop-time video tapes, or movies.



Notes for good legibility: (1) Make letter height 3/8 in. (one grid) or no less than 1/4 in.
(2) Use lower case lettering (as in this sentence)
Short title
11 words or less
Launch-A-Visual Aid (LAVA)

Figure 2. Worksheet for use in drafting a visual. Make the title 11 words or less. Make the letters 3/8-inch high. Use lower-case lettering.

STORYBOARDING

The next step is storyboarding. To storyboard, all the visual drafts are displayed at the same time, either on a wall or a large table. The simultaneous display of every visual quickly reveals redundancy, gaps, and illogical organization of ideas. The display is horizontal, from left to right (Figures 3 and 4-a).

An alternate storyboarding configuration is shown in Figure 4-b. In this configuration the individual components of a subheading are arranged vertically under each subject. This scheme is useful for structuring lengthy material that contains many sections.

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* Work performed under the auspices of the U.S. Department of Energy by the Lawrence Livermore National Laboratory under contract number W-7405-ENG-48.

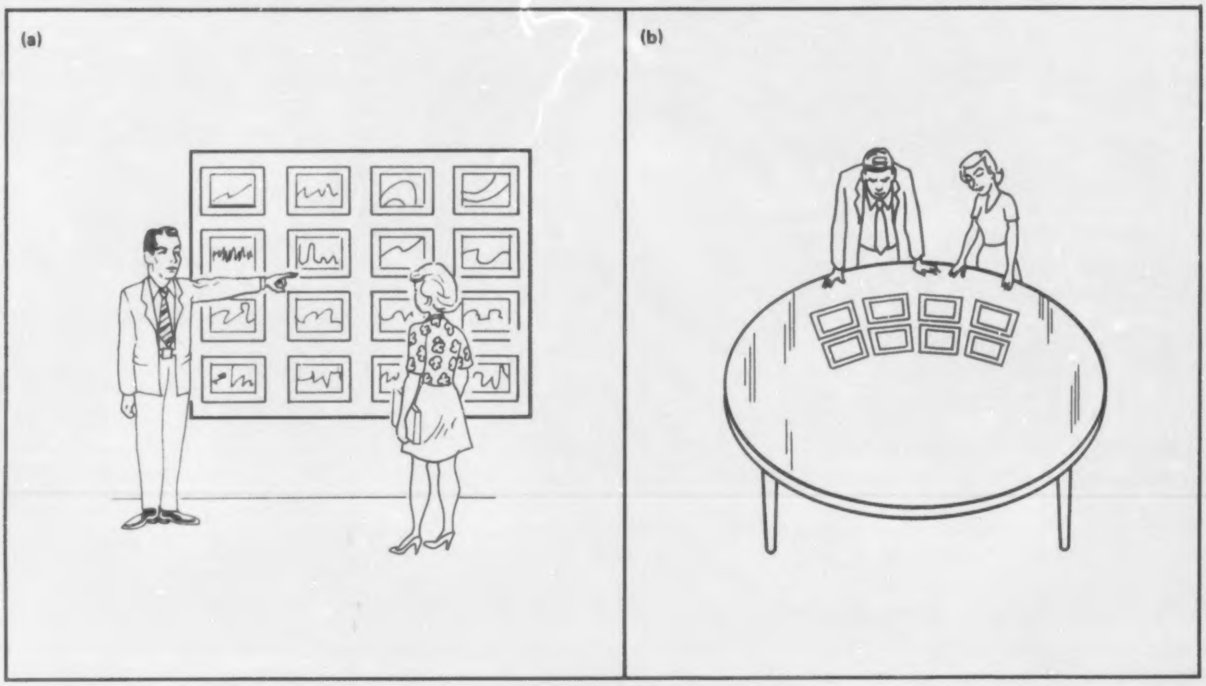

Figure 3. Two locations for a storyboard: (a) on a wall and (b) on a large table.

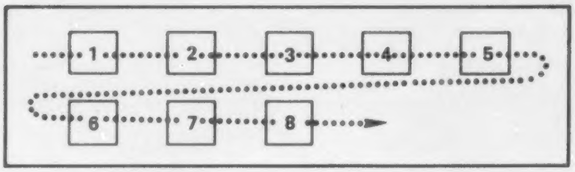

Figure 4-a. Basic configuration for storyboarding.

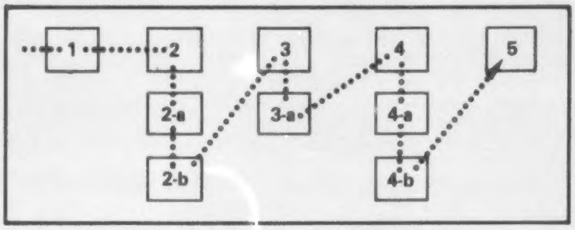

Figure 4-b. Alternate configuration for storyboarding.

When each visual has been drafted and placed in what seems to be the best sequence, all the visuals are displayed at one time in a linear mode. (The presentation is almost always made in a linear fashion.) Individual visual drafts are easily moved, deleted, replaced, or expanded to the number needed. "Missing" visuals are quickly drafted and placed in the proper sequence.

COLLABORATION BETWEEN ARTIST AND EDITOR

The close collaboration between the artist and the editor continues during the preparation of camera-ready art for each visual (Figure 5). On each layout, the artist utilizes his or her design ability and color sense. The editor continues to consult the artist regarding the design elements which promote quick comprehension of each visual's message. Often the artist and editor working together come up with a better graphic than appears on the initial draft, which was sketched under considerable time pressure during the first working conference. The artist is open to visual ideas from the editor, and the editor is receptive to word and organization improvements suggested by the artist.

"DRY RUN"

The visual drafts go through one or more reviews with the client, depending on time and dollar limitations and the complexity of the material. The editor continues to function more as a coauthor with the client, who is throughout the process very open to suggestions and help from both the editor and the artist. When the final visuals are ready, the editor encourages the client to schedule a "dry run" of his or her presentation before an invited audience, usually composed of the client's peers and managers. The editor always attends the dry run and contributes by being a very alert audience member. The editor takes notes on several elements of the presentation, which are detailed in the second paragraph below. Since fear of public speaking is the Number 1 fear of people (fear of death is Number 6*), clients are easily convinced of the dry run's importance and are extremely appreciative of the help and encouragement which the editor provides.

Figure 6 shows a presentation dry run. The visuals illustrated in this figure are overhead transparencies (viewgraphs). However, as previously stated, the visuals could be 35-mm slides, flip charts, posters, stop-time video tapes, or movies.

During the dry run, the editor notes the number of visuals used, the total time used in the presentation, and any changes or improvements that need to be made on individual visuals. The editor also pays the closest attention to the way in which the client is

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* *The Book of Lists*, Bantam Books, Inc., 1978, pp. 469–470.

Figure 5. Continuing collaboration between the artist and the editor.

presenting the material: Is the client's voice sufficiently clear and loud for the room in which the presentation will be given? (If the presentation will be given outside of your facility, find out the dimensions of the room which will be used and hold the dry run in a room of this size at your facility.) Is the rate of speech too slow or too fast? Does the client stand clear of the screen image at all times? Does the client place the visuals on the projector in an easy, unobtrusive manner? Would it be better for the client to have an assistant place the visuals on the projector? Does the client know how to handle friendly and hostile questions from the audience? Does the client stay well within the time allotted?

The editor gives the client the dry run notes in a private session, held as soon as possible after the dry run. If necessary and time allows, a second dry run is given, utilizing corrected visuals and improved platform skills.

"HARDCOPY"

Often photocopies of each visual are stapled together and made available for audience members who may wish to carry away hardcopy of the presentation. The photocopy masters are prints of each visual's camera-ready art. (The page masters can be made by the photo lab at the same time the visuals are made.) Some clients choose to add appendix material to the hardcopy of their visuals. Use of the appendix makes available to the audience very detailed material and references which can't be covered in the strict time and visual-space limits of the presentation itself. Incidentally, the hardcopy is always handed out at the end of the presentation, never before. This sequence forestalls the following situation: the client facing an audience whose members are busily flipping through the hardcopy instead of watching the screen and listening to the speaker.

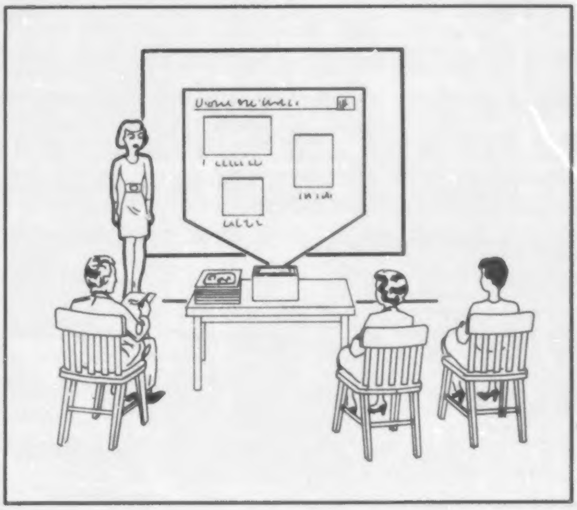

Figure 6. The dry run.

The title visual always contains the presenter's name and work affiliation, in addition to the date of the presentation and the name of the symposium or workshop, if this is applicable. This information makes it easy for any audience member to contact the presenter at a later time. If a hardcopy of the visuals is prepared, the title visual becomes the title page.

CONCLUSION

Presentation techniques are very adaptable tools. They can be used on projects other than presentations (for example, poster sessions and informational displays). Each editor uses these techniques in a distinctive manner. I have described the way I work on presentations at the Lawrence Livermore National Laboratory.

Editing Report Art Differs From Editing Presentation Art*

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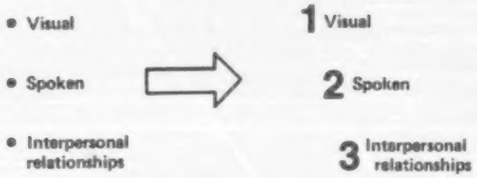
ABSTRACT

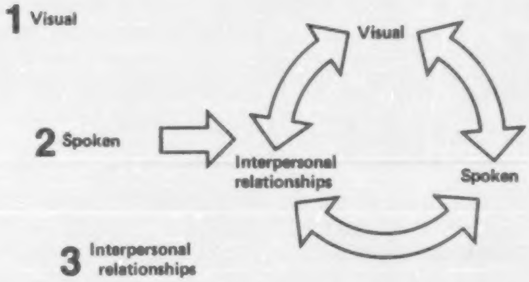
At Lawrence Livermore National Laboratory, the editors bring visual, verbal, and interpersonal skills to the editing of presentation art. In the visual medium, the editor must be aware of how to present written or tabular material in a visual format. While this does not mean that the editor has to be an artist, it does mean that a visual viewpoint is essential. In the verbal medium, the editor must be prepared to help presenters improve their verbal skills, as well as advise them on such ancillary skills as the use of overhead and slide projectors. In the area of interpersonal relations, it is the editor's responsibility to stimulate and harness the creative tensions of the author-editor relationship. The editor who has mastered the above skills will be able to help authors produce excellent technical presentations.

A visual medium demands a visual viewpoint



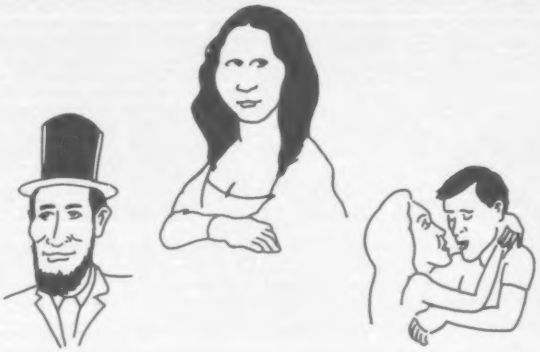
An editor must be able to help an author translate his written and tabular material into a visual format. Note that it is not necessary to be an artist to inject visual elements into a presentation; it is necessary, however, to think visually. Sometimes this can be as simple as slanting a list, putting bullets in front of a list, or numbering a list in such a way that the numbers become an element of design.

Introduce visual cues



Thinking visually means that the editor needs to be aware of the overall design of the visual. For example, if there are elements of the visual that are related to each other, the editor can show that relationship by color coding, cross-hatching, or screens. Or, as shown in the visual, arrows can be used to link the various elements.

Turn words into pictures



One of the most difficult tasks for the presentation editor is to transform written and tabular material into visual images. Fortunately, there are numerous sources of inspiration available to the editors. First and foremost, editors can tap the enormous creative talents of technical artists, who frequently not only have ideas for visual images, but who can do quick sketches of those ideas for the edification of editors and authors. Editors can also leaf through clip art and symbol books (generally available in art groups) in search of ideas. Finally, an excellent source of ideas are the authors themselves. They may have suggestions concerning pictures of experimental equipment, for example, or highly imaginative notions concerning visual ways of expressing a technical concept. Editors availing themselves of the above resources will find it easier to transform words into images.

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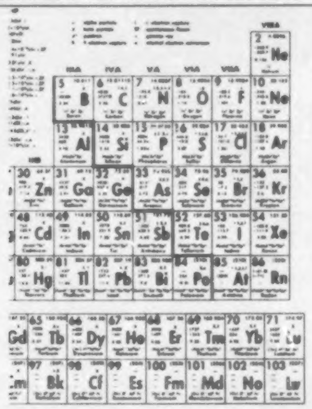
* Work performed under the auspices of the U.S. Department of Energy by the Lawrence Livermore National Laboratory under contract number W-7405-ENG-48.

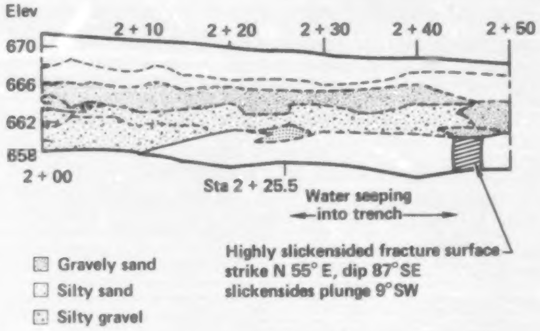
Presentation art has a half-life of 30 seconds



He Ne
B C N O F Ne
Al Si P S Cl Ar
Zn Ga Ge As Se Br Kr
Cd In Sn Sb Te I Xe
Hg Tl Pb Bi Po At Rn
Gd Tb Dy Ho Er Tm Yb Lu
Bk Cf Es Fm Md No Lw

Another constraint that the editor must respond to is that a visual is only going to be looked at for a limited period—usually not more than a minute or two. (If it is up longer, it has the potential of being boring, distracting, or both.) This time constraint implies that highly technical materials such as periodic tables or multi-level equations are inappropriate as visuals: the message gets garbled. Indeed, studies indicate that there should be no more than five to seven elements in any one visual. If, however, the author insists on a highly complex visual, then the editor should at least try to reduce the complexity through the use of color or one of the other techniques mentioned earlier in this paper.

Report art is roomier than presentation art



Elev
670
666
662
658
2 + 00
2 + 10
2 + 20
2 + 30
2 + 40
2 + 50
Sta 2 + 25.5
Water seeping into trench
Highly slickensided fracture surface strike N 55° E, dip 87°SE slickensides plunge 9°SW
Gravely sand
Silty sand
Silty gravel

A presentation editor must be aware of the constraints that a visual medium imposes. For example, there is usually less room in a visual than in report art. Unfortunately, this does not prevent authors from throwing in, on occasion, the technical equivalent of the kitchen sink. When this occurs, it becomes the editor's responsibility to suggest ways of simplifying the visual. One way to achieve simplicity is to divide one visual into two or more. Another way is to use color to highlight differences or similarities. One bonus of this process is that the author will zero in on exactly what message he is trying to convey in a given visual, thereby clarifying and honing the entire presentation.

Legibility becomes a major consideration

I can't read it

As in report art, an editor must be aware of the font, leading, point size, and legibility of any written material that appears in the visual. Legibility takes on special importance because if the audience can't read the text, the visual is a failure. At the Laboratory, we have taken two steps to ensure legibility: first, we have designed a standard visual that stipulates font, point size, and leading; second, we have arranged dry runs during which the visual is actually projected. Taken together, the two steps ensure legibility.

The author needs to speak

The most radical departure from report art is that presentation art is accompanied by speech; i.e., the author has to stand before his peers and speak. This is incredibly difficult for some authors to do. Indeed, studies have shown that speaking tops the list of fears—more people fear public speaking than fear death itself. Editors can reduce such anxieties by coaching authors in platform skills.

Presentation editors should be able to help speakers

There are a number of specific actions that editors can take to enhance a speaker's platform skills and thereby lessen his anxieties. If, for example, the necessary equipment is available, an editor can videotape a speaker and then review the tape with him. This gives the speaker a chance to practice and the editor an opportunity to coach. Such issues as body language, intonation, and the effectiveness of the visuals can be raised in such a coaching session. The editor can also advise the speaker on how to exploit the equipment (projectors or microphones, for example) to the best advantage. In short, the editor, in helping an author produce an effective presentation, takes on many of the attributes of a speech coach.

Interpersonal relationships can be more intense

It is frequently the case that an author will come into the Department with no visuals at all or with visuals that consist entirely of written or tabular material. It then devolves upon the editor to generate the creative tension necessary to transform words into pictures. This can be a wearing procedure and can be likened to an extended author review. During the course of the proceedings:

- Thematic titles are affixed to each visual.
- An illustration is sketched that supports the message of the title.
- The individual visuals are placed in a story board format, and gaps in the logic are spotted and corrected.

When the author-editor relationship works, the resulting visuals will guide the author through his presentation while successfully conveying his message to his audience.

Editing report art differs from editing presentation art

In summary, an editor of presentation art must bring visual, verbal, and personal skills to presentation work. Using visual skills, he must help authors transform written material into visual images, while ensuring that the images communicate the author's message. To ensure that an author can successfully communicate his message verbally, an editor must also be prepared to suggest improvements in an author's platform skills. Finally, the editor must possess the personal skills necessary to generate the creative tensions that foster effective visuals. The editor who masters all these skills will help authors produce excellent technical presentations.

Writing and Editing Stem

JoAnn T. Hackos, Stem Manager; Robert W. Lenehan, Deputy Stem Manager

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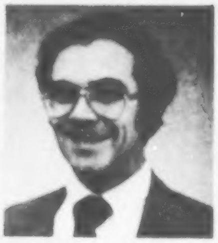

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The Writing and Editing Stem offers new ideas and techniques for the experienced writer and editor as well as providing a sound beginning for those just entering the profession.

In our Call for Papers, we encouraged members to address the problem and the promise of automation in our jobs. Would the proliferation of word processing and sophisticated computer aids mean our downfall? We are encouraged by your response. The members presenting panels and workshops in this stem agree—while computers provide useful tools to make our tasks easier, they are not about to "take over." Attend Session 6B to understand why our high-tech world requires that we develop a high-touch dialogue between technical expert (writer) and editor. Join the four presenters in Session 7A who look at the effect of computers on their jobs and their lives. We find these members designing ways that they can apply traditional editing techniques to word-processed text and enjoying it in the bargain. We also hear editors in Sessions 2B, 4A, 4B, and 10B finding significant new applications for their skills.

The new writer/editor will find several sessions in which presenters offer important advice on how to "get off on the right foot." Be certain to attend Session 2A for discussions that will help you learn technical subject matter quickly and work with clients effectively.

For the more experienced writer, we have sessions devoted to product design, task analysis, graphics techniques in text, document testing, and online documentation. And, don't forget Session 9A's presentation of the effects of new products and audiences on a major corporation's approach to documentation. Presenters in the Advanced sessions challenge the technical writer to design, create, and conduct research. They stress the need for us all to keep informed about the developments in other fields that can help us do better jobs of informing and instructing our audiences.

In addition to the panel sessions, the Writing and Editing Stem provides an exciting array of workshops. On Monday morning, you'll have to choose between a session that gives a new perspective on the place of "rules" in technical communication (1A) and one that demonstrates a game that editors can use to sensitize scientists and engineers to publication processes and problems (1B). On Tuesday morning, those looking for new positions will profit from a session (6A) on resume preparation. Others will be interested in Session 5A that asks them to examine the relative effectiveness of two commonly used technical-writing styles. Those interested in task analysis will find the Tuesday afternoon Task Analysis Game both entertaining and enlightening.

On Wednesday morning, we offer two sessions for editors: the first (10A), a hands-on look at online editing; the second (11A), a systematic approach to copy writing. The third Wednesday session (11B) is geared toward writers who find themselves struggling to document systems that are poorly designed.

Finally, we urge everyone to attend the poster sessions on Monday afternoon before the reception. Writing and Editing offers four excellent papers that lend themselves to graphic rather than verbal presentation.

We are excited about the diversity and depth offered by the 1984 Writing and Editing Stem. We hope you will be challenged by the presentations and inspired to incorporate new ideas and techniques into your tasks.

Sensitizing Researchers to Publications Production

Claudia H. Huff and Ginny A. Thomas, Moderators

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Georgia Tech
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This session presents an innovative and easily replicated training game entitled "Production Roulette" which focuses on the team approach to problem-solving in document development. It is a simulation of the entire process of publication production, from conceptualization through printing, that has been successful in sensitizing scientists and engineers to problems faced by technical communicators.

THE PRODUCTION GAME

This training game is designed to sensitize scientists and engineers to the problems faced by technical communicators. Entitled **Production Roulette** (Copyright 1983, Georgia Tech Research Institute), it emphasizes the team approach to problem solving and document development. The game was first developed as the last of seven modules in an "Effective Writing Refresher" course at the Georgia Institute of Technology. In naming our game, the concept we had in mind was Russian Roulette as opposed to the carnival game of chance, since the objective is not so much to win as to survive.

The game is a simulation of the entire process of producing publications. At the beginning, the participants are divided into groups and charged with producing a publication. They are given a budget and a timeframe. The game consists of one problem for each of six stages: writing, editing, approval, typesetting, layout, and printing. Participants must select one of several options to resolve one problem before moving to the next. Each option is associated with three parameters: time, money, and what we call "quality points." Some options cost more than others; some take longer. And quality points, being positive and negative, can serve as rewards or penalties. For example, if a revised draft slides easily through the internal approval process, it earns quality points.

This mimics the real-life situation we face as technical communicators trying to balance concerns about deadlines, dollars, and quality. In addition, after an option is selected, the participants are presented with a "wild card." This wild card represents the jerk inputs which inevitably arise in the production process and which can seldom be anticipated. By jerk inputs, we mean those inputs which jerk you around, causing shifts in focus or direction and requiring the ability to make quick and sound decisions and mid-course adjustments.

There is a time constraint of five minutes for selecting options and two minutes for responding to wild cards. For the writing, editing, and approval problems, scientists and engineers have their own experiences to draw upon when selecting options. For the typesetting, layout, and printing problems, the game serves to sensitize the players to problems we as technical communicators must confront in our role of coordinating the production process.

The problems, options, and wild cards are all tailored to reflect the situation in our workplace. For example, if cost overruns are incurred, the players must forfeit quality points for each $50 over budget. Since time delays are a problem in our shop, we set it up so that the players must choose between sacrificing their weekends and missing an important deadline -- and each option carries a reward or a penalty in the form of quality points.

PLAYING THE GAME

The discussion session which follows will focus on a variety of options for tailoring the design and mechanics to a specific workplace. Trainees may be grouped in any number of ways, working independently or in conjunction with one another. The first time we played, we had three groups and each group resolved first one problem, and later a second problem. In this fashion, those resolving the printing problem had to take into account any delays or budget overruns due to decisions made by other groups in resolving the previous problems. This method also served to sensitize the trainees to how delays incurred in the writing, editing, and approval stages put additional pressure on those charged with coordinating production.

The second time we played this game, we had two groups work through all six problems consecutively, with a pause in the middle to compare the status of the two teams. This established a sort of competition between the two groups that centered around who could bring the project in on time, within budget, and with the most quality points. We have also played the game with one team of researchers and one team of managers in order to highlight the different perspectives of the two groups.

Success through Simulation: Experiential Training in Writing Skills for Research Scientists and Engineers at Georgia Tech

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A successful in-house training program designed to improve the writing skills of scientists and engineers in a research environment is described, including concepts and goals which governed the design, the evaluation and results, and the course itself. Goals included fostering a better attitude toward the activity of writing, a heightened perception of the role of the editor, and an improved understanding of the publications production process. Evaluation and results support the conclusion that training programs designed to improve writing skills can boost productivity. While all seven course modules are discussed, the production module, which employs a training game, is highlighted. Entitled "Production Roulette," it is a simulation of the entire process of publications, from conceptualization through printing.

I don't have to tell technical writers how important writing is, but scientists and engineers rarely think of writing as a major part of their professions. Yet a study of writing in a corporate research and development group, conducted by two researchers at M.I.T. and reported in the April 1983 issue of *Technology Review,* found that technical professionals typically spend over a third of their work week writing and editing. Though it may surprise some of your co-workers, the conclusion of that study shouldn't surprise you. And that is this: programs aimed at improving writing skills can boost productivity.

I work in the Technology Transfer Branch of the Technology Applications Laboratory at Georgia Tech. This Lab is one of eight laboratories which together comprise the Engineering Experiment Station. The Station conducts approximately 70% of the contract research performed at Tech and is functionally a separate entity from the academic program. The Lab I work for, as its name implies, is concerned with the application of technical equipment, expertise, and methodology to real world problems. The work performed in my lab runs the gamut from technical assistance for the poultry industry to hand-pump installation and maintenance programs in lesser developed countries. We provide free energy conservation assistance for all Georgia industry, and develop microprocessor and robotic applications for corporate sponsors. Our work extends from solid fuel technology for residential users to materials handling applications for the military. In particular, my group -- the Technology Transfer Branch -- is charged with facilitating the transfer of technical information and capability to end users. Our activities center principally around training, publications, and outreach. Obviously, then, we are interested in the communication process. And since writing is a major portion of that process, we are necessarily interested in improving written communication.

This paper describes a successful experience in developing and conducting an in-house training program to improve the writing skills of scientists and engineers. I will discuss the impetus for the program, the key concepts and goals which governed the design, the course itself, and the evaluation and results.

THE FIRST STEP: SELF-STUDY

A Laboratory-wide self-study revealed the need to improve the quality of publications being produced. Management decided that this goal could best be accomplished through a training program which not only improved trainees' skills but also sensitized them to the nature of the assistance available from the Technology Transfer Branch. Thus we started with a strong commitment from management -- a major factor in the success of our program.

Prior to planning the course we conducted a two-tiered needs analysis to determine common problem areas as perceived by individual researchers as well as their managers. The results of this analysis served as a basis for tailoring the performance objectives to meet identified needs.

Several key concepts guided the design of our course. These were derived by stepping back to gain perspective on the process of technology transfer as it relates specifically to written documents. The design also reflects our reliance on a performance-based training methodology: the understanding that people learn by doing. The simulated stepping through of the process of document development from inception through production constituted our experiential model. Besides an emphasis on the process of writing, we selected a variety of active learning techniques over traditional classroom methods. And we elected to have the trainees bring writing projects currently underway to work on in the course. This served to demonstrate the applicability of the skills being reinforced as well as to minimize any resistance associated with taking time away from regular responsibilities.

THE NEXT STEP: GOAL-SETTING

Presented here is the skeleton of a design that we believe can be used by communicators in a technical environment to develop an in-house training program that meets three worthwhile goals: a better attitude towards the activity of writing, a heightened perception of the role of the editor, and an improved understanding of the publication production process.

1) To foster a better attitude on the part of scientists and engineers toward the activity of writing.

We reasoned that if we could illuminate the process of writing and provide some insight into how to facilitate that process, then the trainees would have a better feel for how to get their own creative juices flowing. If we feel better about writing, we're apt to do a better job of it than if we are struggling with feelings of frustration and distaste. As writers and editors, we know that writing can be an immensely difficult and consuming activity. But it can also be exciting and rewarding. By focusing on the transfer of skills which enable and facilitate the writing process, we hoped to engender the fulfilling experience of knowing that you have communicated to your audience technical information that is clear, accurate, and concise.

2) To foster a heightened sensitivity to the role of the editor.

Since many scientists and engineers assume that the purpose of editing is limited to eliminating factual and grammatical flaws, they mistakenly view other types of corrections and suggestions as arbitrary and subjective. To counter this view, we reasoned that if we could impart to the trainees a fuller sense of the purposes of editing, we could foster better relations between the researchers and the communicators, and between the researchers and management. If the researchers become better writers and more fully understand our role as editors, then not only is our job easier, but their job is easier, too. No longer are the technical communicators viewed as another hurdle to jump when trying to get a report through the internal approval process. Instead, we are seen as full-fledged partners in the process of reporting the results of research.

3) To foster an improved understanding of the production process.

This goal served to reinforce the others in that it underwrites the promise of better staff relations, better Laboratory publications, and an increase in the productivity level associated with the production of those documents. I must confess that inclusion of this goal in our program planning was somewhat self-serving. If participants understand why it takes so long to produce a finished publication, we reasoned that they would then have greater respect for the skills involved in editing and production and would thereafter be able to do a better job in planning for publications by allowing adequate time and budget.

The course was team-taught and involved fourteen trainees, representing all branches within the Lab. We promoted the program with flyers and by talking it up with the scientists and engineers in the Lab.

It was first conducted over a four-week period last July, using one morning each week. Each session was scheduled for two and one-half hours. Since then, the total number of class hours has expanded in response to suggestions from Lab management, which were in turn based on comments solicited from the participants. But that's getting a bit ahead of the story. Before considering the evaluation procedure, it's important for you to know more about the course itself.

DESIGN OF THE COURSE

The course is organized into seven modules: reader and subject analysis, planning and outlining, writing, revising, graphics, formatting, and production. Each will be discussed briefly, except the last — the production module — which will be discussed more fully. That's because the methodology we employed for production is innovative and easily replicated. The module may be structured to represent a microcosm of the publications production process as it exists in your workplace. And it's fun — both in the designing and in the implementation. That means it's fun for the trainers and the trainees so it generates enthusiasm as well as understanding.

1) Audience/Subject Analysis.

Any experienced technical communicator spends some time thinking about the audience and subject before ever putting pen to paper, or fingertips to keyboard as the case may be. In contrast, most researchers are trained to write for their peers and when they proceed to communicate results, they often begin without giving a thought to audience. We wanted to make it clear how important it is to zero in on the specific audience and their need for information. One of the techniques we used involved presentation of a problem that required written communication to different audiences, each with a distinct need for information. We then divided the trainees into four groups and asked each group to write to a different audience. After presenting the materials developed, discussion focused on problems associated with writing for different audiences.

2) Planning and Outlining.

In the planning and outlining module, we wanted to get away from traditional notions of what constitutes an outline. Nearly everyone is familiar with the outline which begins with a Roman numeral "I" under which will be found the capital letter "A." For some, traditional outlines are both constraining and inhibiting. Therefore, we focused on what we call "organic outlines" or outlines which enable and facilitate the writing process. An organic outline has no standard format. Its form is derived logically from the content it represents. What distinguishes organic from traditional outlines is that relationships between ideas can be graphically depicted. An organic outline is a structured rendering of concepts and ideas showing relative importance and interrelationships. Once an organic outline has been assembled, it's much easier to arrange a logical and linear presentation of ideas which parallels the traditional outline.

3) Writing.

For the writing module, emphasis was placed on what we call "getting a head start." We stressed the importance and usefulness of the false start for getting past any impasse associated with producing a first draft, or "zero draft" as we prefer to think of it. In discussion, we stressed the difference between the creative process of getting words on paper and the critical process of revising a draft. Our model for this module was Peter Elbow's technique of free-writing, described in his work *Writing with Power* (Oxford University Press, New York, 1981). Writing and editing can be seen as two distinct and often contradictory activities which can throw our skills into conflict.

4) Revising.

While writing is generally a subjective experience of immersion in the material, revising is ideally an exercise in objectivity. The classroom techniques we employed for this module and the one on revising were designed to separate the creative activity of writing from the critical activity of revising in order to make each easier. For example, since the purpose of revising is to cast an objective eye upon one's draft, we asked trainees to exchange papers and edit one another's work before taking the red pen to their own drafts. Time was set aside for each trainee to negotiate changes with their reader/editor. This two-way discussion was critical to the process. In this manner, we were able to introduce the concepts of reader-based and criterion-based editing and to guide trainees through the process of discovering the advantages and pitfalls of each method.

5) Graphics.

Certainly no treatment of technical communication would be complete without a discussion of graphics and the role they play in imparting information. Graphics should be viewed as an integral part of the development of any technical document. We insisted that graphic materials be developed alongside the draft being worked on in the course. For example, the outline developed earlier in the course as part of the homework required a list of graphics to be included and an indication of how they fit with the verbal material being organized into a document. In this module we covered the finer points of graphic communication with a focus on how to use graphics to clarify and reinforce text. Special attention was paid to showing how one set of data can be graphically depicted in several ways, each encouraging different interpretations. As with the writing and revising modules, the emphasis here was on clear, accurate, and concise communication of technical information.

6) Formatting.

The formatting module focused on "finishing touches," and in so doing, set the stage for the production module. Here, emphasis was placed on how to utilize various techniques for attracting and holding the reader's attention, on the importance of the format of the vehicle which is transmitting the message to the reader.

THE PRODUCTION GAME

For the production module, we devised a game entitled **Production Roulette** (Copyright 1983, Georgia Tech Research Institute) which emphasizes the team approach to problem solving and document development. In naming our game, the concept we had in mind was Russian Roulette as opposed to the carnival game of chance, since the objective is not so much to win as to survive. As mentioned earlier, the game is a simulation of the entire process of producing publications. At the beginning, the trainees are charged with producing a publication and are given a budget and a timeframe. We devised one problem for each of six stages: writing, editing, approval, typesetting, layout, and printing. Trainees must select one of several options to resolve one problem before moving to the next. Each option is associated with three parameters: time, money, and what we call "quality points." Some options cost more than others; some take longer. And quality points, being positive and negative, can serve as rewards or penalties. For example, if a revised draft slides easily through the internal approval process, it earns quality points.

This mimics the real-life situation we face as technical communicators trying to balance concerns about deadlines, dollars, and quality. In addition, after an option is selected, the trainees are presented with a "wild card." This wild card represents the jerk inputs which inevitably arise in the production process and which can seldom be anticipated. By jerk inputs, I mean those inputs which jerk you around, causing shifts in focus or direction and requiring the ability to make quick and sound decisions and mid-course adjustments.

From this brief overview, I think you can see how the game works. There is a time constraint of five minutes for selecting options and two minutes for responding to wild cards. This allows plenty of time for follow-up discussion, which in our experience has been both lively and interesting. For the writing, editing, and approval problems, scientists and engineers have their own experiences to draw upon when selecting options. For the typesetting, layout, and printing problems, the game serves to sensitize the players to problems we as technical communicators must confront in our role of coordinating the production process.

Selecting problems for the game is fairly easy since you can rely on past experience and the "war stories" that fellow technical editors can provide. The problems, options, and wild cards can all be tailored to reflect the situation in your workplace. For example, if cost overruns are incurred, the players must forfeit quality points for each $50 over budget. Or if time delays are a problem in your shop, you can set it up so that the players must choose between sacrificing their weekends and missing an important deadline -- and each option can carry a reward or a penalty in the form of quality points.

PLAYING THE GAME

Another important feature of the game concerns the mechanics of playing. Trainees may be grouped in any number of ways, working independently or in conjunction with one another. The first time we played, we had three groups and each group resolved first one problem, and later a second problem. By that I mean that while one group tackled a writing problem, another group worked on an editing problem, and the third group struggled with an approval problem. Later, each group worked on either a typesetting problem, a layout problem, or a printing problem. We paused between each set of problems to let everyone know where they stood with respect to the budget and the timeframe, as well as to tally the quality points earned or sacrificed along the way. In this fashion, those resolving the printing problem had to take into account any delays or budget overruns due to decisions made by other groups in resolving the previous problems. This method also served to sensitize the trainees to how delays incurred in the writing, editing, and approval stages put additional pressure on those charged with coordinating production.

The second time we played this game, we had two groups work through all six problems consecutively, with a pause in the middle to compare the status of the two teams. This established a sort of competition between the two groups that centered around who could bring the project in on time, within budget, and with the most quality points. We have also played the game with one team of researchers and one team of managers in order to highlight the different perspectives of the two groups.

Before moving on to consider results and evaluation, I need to insert a caveat. While it's true that devising this game can be a lot of fun, it's also a lot of hard work. You have to work through each option and wild card in order to make sure that everything fits just right. It's necessary to be absolutely certain that the worst case and best case scenarios are within the defined range of possibility. Steps must be taken to ensure that players will not fall so far behind schedule and over budget that they become frustrated. Adequate incentives must be devised to keep interest up and maintain an obvious relationship to reality. Similarly, penalties should be imposed with care. Efforts should be geared toward matching problems with groups so that, for example, one group doesn't get all the most difficult problems. In addition, the game should be tested repeatedly and refined before employing it in a structured learning environment. You should also know that administering the game requires a high level of skill on the part of the trainers, not only to keep the players on schedule and match up the appropriate wild cards with the options selected, but also to make the most of the discussions.

RESULTS AND EVALUATION

Finally, I'd like to present the results of the evaluation procedure we employed to measure our efforts. The evaluation instrument was designed to measure each module according to the following criteria:

- °whether the class objectives were met
- °whether personal objectives were met
- °the quality and usefulness of the content
- °the quality and appropriateness of the delivery
- °the quality and appropriateness of the methods

The evaluation scores, on a scale of 0 to 5 with 5 representing the most favorable response, ranged from a low of 3.4 to a high of 4.6, with the majority of responses clustering around 4.0. Written comments received from the trainees were generally very favorable. Participants indicated that the class time was well-spent and some suggested that managers would benefit from participation in the course. A four-month follow-up survey indicated that trainees were indeed employing the skills and techniques stressed in the course.

In addition to the evaluation instruments, we sought verbal feedback. As previously mentioned, each manager discussed the course with participants from within that branch. The managers then met to share their observations and suggestions with upper management and the trainers. These discussions served to bring out important points that did not surface on the written evaluations.

This three-stage evaluation process only tells part of the story. As with any endeavor of this sort, many results are intangible and difficult to quantify. But I want to share with you some of the results we've noted as pertinent to our goals. Several participants, with no prompting from us, sent laudatory letters to upper management which acclaimed the value of the course. The roster of participants for the second offering was completely filled before the first course was even completed. Not long after the first course ended, my branch was booked solid for the next six months with requests for assistance on publications. As a matter of fact, we're so busy these days that we're adding staff to assist in meeting the goal of producing higher quality publications as well as the associated goals of improving staff relations and increasing productivity.

PARTNERS IN THE PROCESS

More and more, researchers are now turning to the Technology Transfer Branch for assistance with documents at an earlier stage in the development process. We believe this has increased the productivity of all staff members involved in conceptualizing, writing, editing, and producing publications. That's the partnership idea referred to earlier -- the technical editor as a full-fledged partner in the process of reporting research results. Our overall goal of reducing the amount of staff time required to produce major publications is a sound one. In achieving that goal we have enabled the Lab to plan on producing even more publications since less time and hassle are involved with the entire process. The course is especially good for new employees since it serves as an orientation to the various kinds of work being performed in the Lab. It has also inspired teamwork between branches because trainees learn more about technical expertise and projects outside their own group.

There's one more measure of our results that is worthy of note. Upper management has asked us to package our training course so that it can be marketed to other Labs in the Station as well as to external clients. We view this as a strong expression of confidence in and support for our efforts.

I think you can see why we are not reluctant to pronounce our training program a success. As technical communicators, we have benefitted as evidenced by the improved copy which lands on our desks. And managers are spending less time on editing, too. The scientists and engineers have benefitted since they now know where and when to turn for help, and they feel better prepared to undertake writing assignments. And certainly our various audiences have benefitted from the enhanced quality of the documents we produce.

Rules that Shape the Technical Message: Fidelity, Completeness, Conciseness

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The term rule is defined, following Susan Shimanoff, as a "prescription that indicates what behavior is obligated, preferred, or prohibited in certain contexts." Shimanoff casts rules in the if-then format, the if clause specifying the scope condition (context) of the rule, and the then clause stating the behavior indicated. In this paper, three basic rules of technical communication are examined and cast in the if-then format: the fidelity rule, the completeness rule, and the conciseness rule. Since two rules can be in conflict, it is useful to know the relative importance of rules: it is demonstrated here that the completeness rule supersedes the conciseness rule because the completeness rule is based on ethical considerations, while the conciseness rule is an expedient.

RULES IN CONTEXT

Rules do not float in a vacuum; they are intertwined in the context of our lives and work. In the work of technical communication, our purpose is to convey messages so clearly that the reader will receive one meaning, and one meaning only (1). Of course there may be subsidiary meanings in any communication, but the "one meaning, and one meaning only" criterion applies to the principal technical message that is being communicated. The degree to which that one meaning is understood can be tested operationally: can the reader reproduce, either mentally or physically, the mental or physical actions referred to in the message? If so, the "one meaning" criterion has been met (2). In the context of the purpose of technical communication, then, rules exist primarily to carry out the clear expression of meaning.

In technical communication, rules abound. There are rules of grammar and punctuation, rules of usage, and "house rules" specifying institutional style. Indeed, it sometimes seems that technical editors, especially, are seen as keepers of the rules, somewhat like a sacred flame. Questions to editors often start with the words "What is the rule on . . .?" and if the information-seeker receives a situational reply that begins with "It all depends on . . ." or "There are different schools of thought on that . . .", the conversation may tend to bog down until the editor shores it up with "All right; I think you should do it this way . . .", the editor having made the situational choice and applied the appropriate rule.

It is beyond the scope of this paper to explore the complicated interweaving of rules in technical communication, the hierarchies of rules, and their sources of authority. Instead, I have emphasized what I believe to be the characteristic rules of technical communication: the rules of fidelity, completeness, and conciseness, which I have earlier traced to positions set forth by Francis Bacon and the Royal Society of London (3).

WHAT IS A RULE?

In using the term *rule*, I have relied on the definition of Susan Shimanoff, who, in *Communication Rules: Theory and Research*, defined *rule* as a "followable prescription that indicates what behavior is obligated, preferred, or prohibited in certain contexts" (4). She casts rules in the *if-then* format, the *if* clause specifying the scope condition (context) of the rule, and the *then* clause stating the behavior indicated (and whether it is obligated, preferred, or prohibited).

For example, we might state a rule thus:

> *If* you are in church,
> *then* you should not applaud after the soprano sings.

Here the *if* clause specifies the context, and the *then* claus indicates the behavior. In a different context, we could frame the rule differently:

> *If* you are at a concert,
> *then* you probably should applaud after the soprano sings.

Of course, rules can be broken – it is possible to applaud the soprano in church. But if we do, people may think we are stupid, ignorant, or possibly a little crazy. They will probably think that we don't know the rule or that we don't (or can't) care. (At the same time, however, we will certainly get their attention. Rule-breaking is an excellent attention-getting device.)

Rules, when they are defined in this way, differ from physical laws precisely because the rules are applied by human beings, who have the power of choice, and we can choose to break the rules if we want to. Physical laws, by contrast, do not admit the power of choice. For example, we cannot choose to break the law of gravity; at the very least, if we disregard the law, we may do so at considerable physical peril.

From this perspective, our socially agreed-upon "laws," in contrast to physical laws, are really rules. Our social laws, which result from human agreement in legislation, are rules that can be broken by human choice, although negative results may well follow.

Thus the essential elements of rules are context, behavior, and choice, along with the prescriptive force of the rules themselves (5). All these elements apply in the way we follow, bend, or break rules in technical communication. And when we cast a rule in the *if-then* format, we can reveal not only the behavior indicated, but also the purpose of the behavior (in the scope condition, or *if* clause). For that reason, the exercise of formatting rules in this way can be very instructive. I have used this pattern in formatting the rules of fidelity, completeness, and conciseness, as discussed below.

THE FIDELITY RULE

The fidelity rule rests on a principle as simple as that of the Commandment "Thou shalt not bear false witness"; in other words, it is

The Role of Rules in Technical Communication

Mary Fran Buehler, Moderator; Alberta Cox, Workshop Leader

Three of the panel participants, pictured at about the time they started in the field of communication, are (left to right), Mary Fran Buehler, Alberta Cox, and Lola M. Zook. For a possible explanation of the fourth panelist's absence, see below.

The discussion of rules in this panel/workshop will not be tutorial; no one will explain where to put commas. Panel members will assume that the audience is already familiar with the "rules" of punctuation, spelling, usage, and similar matters. Instead, panel members will explore such questions as: What is a rule? What kinds of rules do we have in technical communication? Which rules are most important? What do we do when two rules are in conflict? How do we know when to break a rule, and how can managers help writers and editors to develop the judgment to break rules wisely?

All the panel participants have advocated using rules situationally — that is, adapting rules to a given set of circumstances in technical communication, rather than applying rules blindly in all situations. This panel advances that position into problems of application: How do writers and editors carry out the advice to use rules flexibly? What does management do when rules are bent or broken? How do we judge whether we are right in our evaluation of rules?

As all experienced technical writers and editors know, there are many differences of opinion on rules, even within our own community of interest. Language usage is only one aspect of the application of rules, but because usage questions pervade so much of our work, and because these questions often generate such heated partisanship, questions of usage will be used as an example of attitudes toward rules.

A questionnaire on usage will be given, filled out, and discussed in the workshop. The questionnaire is designed to reveal attitudes toward rules, rather than knowledge of the rules themselves, which will be assumed. Further, the workshop will attempt to identify the reasons why people adopt or reject rules, rather than the fact that the rules are simply adopted or rejected. The workshop is not expected to produce consensus on usage rules, but should indicate how divergent our attitudes toward these rules may be and the kinds of arguments we use to defend our positions. The discussion should also provide some guidance on applying rules in individual situations.

As an example of breaking even a minor, unspoken rule, consider the photographs on this page. Panelists as experienced as the members of this panel/workshop — all of whom are Associate Fellows of STC — are not usually represented by college-age pictures. You may also have noticed that the three women on the panel were able to provide college-era pictures, while the male panelist, Don Bush, was not. From this, we might be tempted to say something like:

> As a rule, college women have their pictures taken more often than college men do.

But this is not a rule in the sense the panelists will use the term. If this statement about college women and photographs is true (and it could be tested empirically), then it might be considered a regularity, but it is not a rule, according to the definition to be used in this panel.

wrong not to tell the truth. The fidelity rule thus prescribes faithfulness, but the question remains, faithfulness to what?

Following the "one meaning, and one meaning only" criterion, we can consider *meaning* to be the observation or conception of reality by the originator of the message. Thus the fidelity rule can be stated as follows:

> *If* we wish to communicate technical information truthfully, *then* our message should be faithful to our observed or conceived reality.

In more specific terms, this rule comprises several subrules that have been generally accepted in technical communication:

1. We should strive for objectivity.
2. We should evenhandedly present both positive and negative results.
3. We should communicate in quantitative terms.
4. We should not employ techniques of suspense, poetic ambiguity, or irony.

THE COMPLETENESS RULE

No matter how well we follow the fidelity rule, however, there is always the possibility of honest error in our observation or conception of reality. Therefore, at least from the time of Francis Bacon, the completeness rule has offered a means of correcting error. In Bacon's words,

> . . . whenever I come to a new experiment of any subtlety (although it be in my own opinion certain and approved), I nevertheless subjoin a clear account of the manner in which I made it, that men, knowing exactly how each point was made out, may see whether there be any error connected with it and may arouse themselves to devise proofs more trustworthy and exquisite, if such can be found . . . . (6)

The basis for the completeness rule, again, is ethical: we should not only communicate truthfully, as in the fidelity rule, but we should also lay bare our physical and mental actions for scrutiny by our peers, who can then detect our errors. This seems an almost impossibly high-minded demand to make of fallible human beings.

Thus the completenss rule can be stated as follows:

> *If* we wish to communicate technical information ethically, *then* our message should be complete enough to allow the receiver of the message to match his or her actions, mental or physical, with those conveyed in our message.

THE CONCISENESS RULE

In a way, the conciseness rule is a counterbalance to the completeness rule. If masses of information need to be conveyed to achieve completeness, then that information should be communicated as concisely as possible or the recipient may be overwhelmed. The two rules can obviously be in conflict, and the resolution of tension between completeness and conciseness rests on the characteristics of the audience. The question is not only Complete for whom? but also Concise for whom?

The practice of conciseness is not simple. One of the most quoted statements urging conciseness is that of William Strunk, Jr., and E.B. White, in *The Elements of Style*:

> A sentence should contain no unnecessary words, a paragraph no unnecessary sentences, for the same reason that a drawing should have no unnecessary lines and a machine no unnecessary parts. This requires not that the writer make all his sentences short, or that he avoid all detail and treat his subjects only in outline, but that every word tell (7).

The difficult question here is: What is unnecessary? Again, the answer depends on the audience. The conciseness rule thus reflects the needs of the audience for communication that is efficient, so that the audience is not required to perform unnecessary work. The rule can be stated as follows:

> *If* one wishes to communicate technical information efficiently, *then* one should communicate concisely: i.e., with no unnecessary words.

We now have a hierarchy of significance for the completeness and conciseness rules. In cases of conflict between the two, completeness should come first: the obligation of completeness is ethical, while the obligation of conciseness is practical. The ethical consideration should supersede the practical one.

LEVELS OF RULES: AN EXAMPLE

A knowledge of the relative importance of the basic rules that guide technical communication can guide our choices in individual situations.

As an example, take the question: Is it acceptable to cite "personal communication" as a reference in a technical paper? The writer or editor who is preparing the paper may determine, first, whether the journal to which the paper is to be submitted has a house rule forbidding the citation of personal communications. If the journal does forbid such citations, the question is answered. (The problem of incorporating the necessary information into the paper may, of course, remain.)

If the journal does not forbid such citations, the question becomes more complicated. What is the purpose of the citation? Reference citations ordinarily fill one or both of two functions: (1) the documentary or courtesy function and (2) the completeness function. That is, the reference may simply give proper credit to the source of a concept or a piece of data, or the reference may actually be required in order to understand the technical message completely.

Since the reader of the paper cannot obtain the information in the "personal communication" reference easily, the reader will be ethically disadvantaged if the citation is required for completeness. If, however, the citation is merely required as a courtesy documentation, the reader will not even be inconvenienced. Therefore, we may use several rules to arrive at a decision: (1) the journal's house rule, if any, (2) the rules of reference citation for courtesy and completeness, and (3) the completeness rule.

IN CONCLUSION

This discussion has been only a brief examination of some rules that shape the technical message. The different types of rules in technical communication, the different sources of authority that support them, and the relative importance of rules that may be in conflict provide a rich field for further exploration. A knowledge of the sources and relationships of these rules can provide valuable guidance to the technical writer or editor. And if we remember that rules rest on elements of context, behavior, and choice, we may be further guided in choosing the appropriate behavior for a given context.

ACKNOWLEDGMENTS

My debt to Susan Shimanoff, whose work in rules theory has shaped my own work and many other aspects of my life as well, is so great as to be inadequately acknowledged in the references here. I am sure, too, that the title of her dissertation at the University of Southern California, "The Place of Rules in Human Communication Inquiry" (the basis for her book *Communication Rules: Theory and Research*), must have shaped the title I chose for the panel in which this paper appears: "The Role of Rules in Technical Communication."

To Carolyn R. Miller, I also owe a much greater debt of gratitude than a reference citation can accommodate. Her paper "Rules, Context, and Technical Communication," cited below, was my first encounter with rules theory and sparked my first interest in the study of rules – an interest and a study that have proved richly rewarding and that beckon invitingly into the future.

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Rules and How to Break Them—A Management View

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Technical communication establishments function under a very wide range of rules reflecting principles of communication, design, and rhetoric applied in specialized scientific and technical settings. Managers of communications groups in such settings need to control operations and enforce standards, yet at the same time permit editors and writers flexibility in applying and adapting rules to improve levels of communication. Some objectives for managers facing this two-headed problem, and some ways for them to interact with editors to further these objectives, are considered in this paper.

There is no consensus -- and never will be -- about the rules of technical communication. There are no sacred tablets, no decrees of cause and effect, no laws like those of gravity and magnetism that govern the physical universe. We in technical communication do operate under rules but they are our own rules -- fashioned from centuries-old patterns of usage and last-week developments in technology, compiled and adapted in each publications office to meet its needs in its peculiar set of circumstances. We assemble rules to deal with a tremendous range of subject matter, from the broadest principles of communication and design to the most precise details of grammar and technical nomenclature.

RULES VS. FLEXIBILITY

Some publication managers, writers, and editors maintain more rigid systems of rules -- style books, company guidelines, product specifications -- than others do. Some operate under the close scrutiny of author-scientists, others operate with great latitude. In all cases, however, we work under some collection of rules, from the pronouncements we learned in seventh-grade grammar to a client's requirements for level of language in an operator's manual. And we all, numberless times, have tried to apply rules in a given situation and found that assorted sets of guidelines sent us off in different directions, and sometimes were in outright conflict. We all have had to break rules, for what we considered good and sufficient reasons.

The interaction of these two forces -- the need for rules and the need for flexibility -- determines how we make decisions related to rules. Several writers on this subject, including the members of this panel, have advocated the situational application of rules. That is, we have urged writers and editors to look at the various factors in each situation -- the purpose, the audience, the message itself -- and apply the rules in the light of these factors.

But what of the manager ? How does a manager exercise control over a staff and an output under such elusive circumstances ? How can standards be met ? When does flexibility turn into unpredictability, or even insubordination and chaos ?

HOW THE PROCESS WORKS

These questions turn out to apply most directly to the management of editing. The writer, in his or her initial draft work, is concerned only peripherally with such things as rules of technical communication. At that point the writer's mission is to set down the facts, and any conclusions therefrom; his or her concern is with subject matter, the what that needs to be said. Only in later rounds does major concern shift to how the material is being said, and hence to the application of rules. These later stages of the work might be done by an editor or by the writer who, in revising the draft, is acting as an editor. In either case, the application of rules is consciously embodied in the editing process, much more than in the writing.

To see this process as a manager sees it, we first need to understand something. A person charged with managing a group of editors and writers can succeed only if he or she recognizes one condition: In a literal sense, the assignment is impossible. A manager can plan and guide and train and cajole and monitor -- and even fire -- but he or she cannot "manage" the work of an editor. The explanation of this statement lies in the fact that an editor is constantly, constantly, applying judgments and making choices with every mark made -- or not made -- on the manuscript. The manager can prescribe some of the choices, but only up to a point. The only way the manager could totally manage the process would be to take over the job, apply the judgments, and make the choices and marks. Since he or she cannot do all the work personally, the manager must recognize, like it or not, that the editor is going to have to be trusted to make reasonable judgments and choices. So: How does one "manage" in such a quicksand ?

THE MANAGER'S VIEWPOINT

To begin with, the perfect manager (by my definition if by no other) will have a clear and conscious grasp of (1) the intrinsic objectives of technical communication, and (2) the practical and variable constraints that time, money, and organizational policy may place upon the possible accomplishment of those objectives in this communications unit. Such a manager knows what he or she wants to accomplish and -- acknowledging that the real-world situation has to be accommodated -- can judge the prospects of success. Only a realistic awareness of these factors will give the manager a solid foundation for considering how to approach the details of managing the unit.

In the discussion that follows, the emphasis is intended to be upon the management view of rules, not on "how to manage." However, the distinction is often unclear, since almost any aspect of the manager's activity turns out to have some involvement with, or effect on, the application of rules and regulations.

The Operating Context

Let us make some assumptions about the framework in which our perfect manager operates:

(1) This manager is committed to the general objectives of fidelity, completeness, and conciseness for the technical communications work to be performed in this unit. He or she has considered the relationship of these objectives to the range of products to be processed, organizational policies, and the typical time and money constraints on processing. These considerations translate into the working basis for setting priorities and establishing guidelines for editorial work.

(2) This manager has communicated the general objectives of fidelity, completeness, and conciseness to his editorial staff. This provides a basic value system, a foundation for the practical choices and decisions to be made during work on specific manuscripts.

(3) This manager has collected as much information as possible on company publication and related policies, preferred approaches, taboos, distribution customs, noteworthy successes and failures, general budget constraints, and so forth. This background information is readily available to the editors for guidance as they consider how to handle various types of publications.

(4) This manager has arranged for development of style and format guides for use by all personnel who do editing and production work. These guides have the purpose not of enforcing rigidity but of establishing preferred (or standardized) patterns and usages.

Under ordinary circumstances, the guides will do the following:

- Speed the work and raise the efficiency of editorial and production personnel by lessening the number of unstructured decisions to be made on each manuscript.
- Enable these persons to work similarly, so that various people can work together with comparable results on a large or crash project, or on a series of related projects.
- Through constant refining of the guides from experience, improve the level of presentation of the organization's communications products.

Under extraordinary circumstances, when an editor faces some conflict or other reason to "break a rule," the existence of these basic guides may clarify some of the choices. It is important that the editor be able to see the conflicts clearly and be conscious of the factors to be considered in adapting the rules to the situation.

Dealing With the Individual Editor

So much for the framework in which the perfect manager operates. In dealing with individual editors, this manager follows certain customs that help develop the editor's ability to interpret rules and make reasonable choices.

First, the manager *takes time to be very thorough in giving the editor an assignment*. What the editor is, and is not, responsible for must be made very clear; this is the manager's most effective method for maintaining a desired degree of control over the work on the manuscript. Manager and editor will discuss the purpose and audience of the document, and the effect these will have on the editing process; values and choices will be quite different for, say, a professional journal article and a consumer newsletter. Manager and editor will also discuss the time available and the target schedule, and should reach agreement on probable priorities of things to be done if the time is limited. They will discuss any client specifications, and an evident conflict with customary rules. This kind of introduction to an assignment alerts both editor and manager to possible problem areas, and gives the editor initial guidance in making choices.

Second, the manager *has a system for keeping track of the editor's progress* on the assignment -- a routine procedure that includes all editors, so that the manager does not appear to be nagging a particular editor. A brief daily written progress report from each editor, an editor-by-editor summary collected by a secretary, a routine daily base-touching with each editor, or some other low-key procedure will serve the purpose. What the manager needs is a way to obtain cues if an editor is falling behind schedule or having trouble, so rule conflicts or other problems can be discussed before the editor has lost too much time. With such interactions, editors can be expected, over time, to develop confidence as to when to go ahead and act on their own analyses and when a problem ought to be discussed with the manager.

Third, the manager *monitors the finished product* as appropriate. For an inexperienced editor, or for an experienced editor new to the system, the monitoring review will be thorough, and a detailed feedback session with the editor will cover application of rules and other choices that would benefit from tutorial discussion. It is essential that the manager bestow praise as well as criticism in this session. For more experienced editors, the amount and type of managerial monitoring will depend on circumstances -- for example, how many times the editor has handled similar assignments, how closely an author will go over the manuscript, or what company policies might be involved. However, some "spot" review of important sections is always desirable.

Even for a highly experienced editor, the manager will always hold a debriefing session, in which the editor reports on the state of the manuscript, the main problems, and any interesting or troubling characteristics.

Ways of Interacting

Beyond these contacts on individual assignments, the perfect manager will have more general methods of interacting with the editors to encourage an atmosphere of "controlled flexibility" (to use Mary Fran Buehler's apt phrase). Each manager's personal style, along with the circumstances of the particular office, will determine how these interactions take place, but here are some examples:

- The perfect manager takes pains to involve the staff in compiling the original style and format guides, and in revising and expanding them on a continuing basis. People are much more likely to follow rules they have helped to develop, and they will have a much better basis for making decisions about rule conflicts -- for example, between standard company format and client format preferences -- if they know what led to the formulation of the original rules.

- The manager is constantly alert to changes in company policy or other matters on which the editors should be informed. The manager also remembers that the information path should operate in both directions; editorial problems with conflicts between company standards and client product requirements, for example, should be reported to upper management in the hope of preventing aggravated difficulties in the future.

- The manager tries to keep the editors, and other staff members as well, working as a unit. Technical problems, especially with regard to rule conflicts or amplifications, should be shared and discussed. Regular staff meetings, if kept brief and focused on matters of interest to everyone, can be used to encourage comparable reactions by group members when problems arise. In such meetings the manager, at all costs, avoids monopolizing the action, using such avenues as rotating assignments for a brief presentation on some editorial points, such as those presented in Fern Rook's column in Technical Communication (1), or in The Editorial Eye (2).

- The manager recognizes responsibility for the training of staff members, both to improve their work and to improve their career prospects. Often the more senior editors will benefit from being drawn into the training of junior personnel. This kind of activity, whether individual tutoring or group presentation, provides an excellent opportunity for focusing on rule interpretations and conflicts, as a further means of encouraging all staff members to operate along similar lines.

- The manager is available. That's a simple statement to make but a terribly difficult one to live by, since frequent interruptions interfere with getting other work done. Nevertheless, the person who directly supervises people doing detailed and non-rote work is needed to answer questions and give help. If an editor struggling with a rule conflict -- for example, relaxing some grammatical niceties in low-literacy-level materials -- faces a closed door and has to wait until tomorrow to get help on the problem, the manager is likely to lose the opportunity to influence the bending of rules in this situation.

MAJOR CONCERNS

As a final point, let us return to this perfect manager's view of the broad principles of fidelity, completeness, and conciseness in technical communication. Implementing the values of completeness and conciseness usually involves much balancing of technical considerations, but fidelity is fundamentally a moral concept. This distinction is an important one for the manager; it means that an error in fidelity is more serious than other types of errors, and hence the manager needs to feel a special concern for the detection of errors against fidelity.

In considering the editor's role in fidelity, one first thinks of the need for the editor to truly render the author's statements of facts and opinion. This is important, but the concept of fidelity is more basic than that -- the fidelity must be to the truth itself, rather than to what the author may have said. This kind of problem is most likely to confront the editor when different parts of the same document do not create the same impression.

For example, suppose a technical report presents Conclusions and Recommendations from an experimental study but the text of the report does not provide a clear basis for drawing such conclusions. Attention to the principle of fidelity will require that information, discussion, assumptions, or qualifiers be added as needed to correct the imbalance; if such emendations to the text cannot be justified from the study, then the Conclusions and Recommendations will need to be modified to a form in which they are supported by the report.

Or suppose in a proposal a writer makes some "blue sky" claims for the company's capabilities but does not document them. A little hyperbole is, of course, the staff of life for proposals, but there are limits; one does not want the prospective client coming back with critical questions, even if answers can be found. Again, fidelity requires adding documentation or modifying the proposal claims to reflect reality.

Judgments that bear on fidelity can be among the most difficult matters faced by an editor. They may also be the most sensitive, and they may require more sophistication -- and more clout -- than some editors have. Problems of this sort may require the manager's assistance in negotiations with the author or project manager. Without exception, in instructing and monitoring the editor and especially in reviewing the edited manuscript, the manager must be alert to any question that bears on fidelity.

It is evident from my assumptions and descriptions that I expect this paragon of a manager to have infinite common sense, patience, and sensitivity, and to work 16-hour days. You may have different ideas as to what constitutes the perfect manager. Perfect or imperfect, managers will operate in many different ways depending on their situations, the requirements placed on them, the type of people they supervise, and their own personal styles. But no matter what these variations may be, the managers are going to be trying to guide their editors in making, following, and sometimes breaking rules. And the commonest measure that will be applied will be: Does it help communication ?

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Communication vs. Correctness

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This paper examines three powerful influences on English grammar: consistency, history, and current idiom. Numerous examples are presented to show the relative importance of the three.

I have long been interested in language. I was introduced to grammatical rules very early, by my parents. I codified these rules in the sixth grade
"I-we-he-she-they-and-who-are-subject-pronouns."
"Is-are-was-were-be-am-and-been-never-take-an-object."

We drilled on diagramming sentences. Miss McGillvray taught us the difference between good and bad, right and wrong. It was all so orderly, like "practical arithmetic," and bank statements and batting averages.

This attitude was reinforced by my education in high school and college, and later in my first job, as a reporter for the Kansas City Star. Some of you may not know that the press is one of the last strongholds of rigid grammatical consistency. There I learned that there was no such thing as a raise in pay -- it was a rise, analogous to the rise in the river. To say a raise in pay would be -- yes -- inconsistent.

A few years after that, however, I took two graduate courses in advanced grammar at the University of Tulsa. There I learned a central principle, a career-changing principle. This is a principle about which we can all agree. There will be no argument. We are all together on this. The English language is inconsistent.

Why did I have to go to school to learn this? Well, they taught me that two usages can coexist: The brass shined, and it also shone. A theory can be proven and also proved. Technical Writing is sometimes capitalized, and sometimes it is not. And the clincher: A tremendous number of words can be spelled in more than one way, and either one is right.

The goal of consistency, of course, is too often the goal of technical writers. Somehow, it seems logical to apply the rules of consistency, even where no consistency exists. Consistency, however, is not a cure for bad writing. It is like taking aspirin to cure dandruff. Our aim is communication.

The word English itself is marvelously inconsistent. It does not follow our rules of pronunciation. It is pronounced not "eng-lish" or "en-glish," but "ing-glish," with a short "i" and two distinct "g" sounds, one in the diphthong and one as a hard consonant.

What is all this jazz about English consistency?

When I began to get serious about studying English grammar, I discovered a horrifying thing. It is unthinkable, but here it is.

Even grammar books are inconsistent. They do not always agree. In fact, one of my favorite books is Goold Brown's Grammar of English Grammars, which was written in 1859 and contains, in 1,000 pages of very small type, all of the differences the author found in contemporary grammar books.

Style books are even worse. One of the axioms of our business is that style books violate their own rules. This is true even for the good ones. Style just gets too complicated.

So what do we do?

I myself cannot disregard the rules. I am now an editor, and also a teacher. I subject my students to the same sixth grade rules. I am not against them.

However, I have learned to classify them in three ways. I use two criteria: history and idiom.

First, there are the rules that are part of the language historically and that are also consistent with idiom. The most important of these is the agreement of subject and verb. Another is the use of subject and object pronouns, even who and whom. Some grammarians wishfully suggest that whom is disappearing. This is not so, of course. We are stuck with it. It is part of our history and our idiom.

I also believe that we should largely adhere to prohibiting the split infinitive and ending the sentence with a preposition. These are good rules, not bad ones. The split infinitive is generally awkward and the ultimate preposition is often weak. The rhetoricians of the 18th Century proclaimed that sentences should not be ended with any "inconsiderable word," and that is a rule that I still try to follow.

But I will indeed -- or shall indeed -- accept violations of even these historic rules if the violations fit our idiom. "Five dollars is too much." "Twenty-five years of service was celebrated." And, of course, "You'd better watch out." These seeming violations have a historical basis in themselves and a strong foundation in English idiom.

The second class of rules includes those that have neither a foundation in history nor in idiom. Some of them are imposed on us by the people whom Jim Quinn, in his excellent book, "American Tongueand Cheek," calls the "pop grammarians": John Simon, William Safire, Edwin Newman, and others who write for newspapers and magazines.

One of these new rules is the prohibition against using the word hopefully in an indefinite sense. This prohibition dates from only about 1960. Many people object to "Hopefully, the weather will be clear." because the weather does not hope. But these same people do not object to "Clearly, the weather will be foggy." Both hopefully and clearly remain legitimate adverbs, used in the grammatically "absolute" sense.

What are some of the other non-rules?

People often want to restrict the word none to the singular, in spite of more than 1,000 years of plural usage, as in "And then there were none." Some people also object to using nouns as verbs, as in to host or to impact. When I was young, people were sometimes complaining about using contact as a verb. We don't hear much objection about that today. We can indeed say to contact, to lecture, to dream. This flexibility is one of the great strengths of English, not a weakness. Shakespeare helped us realize this strength, and repeatedly used expressions like "Sermon me no longer."

We can also use nouns attributively -- as adjectives -- and can say electronics engineer without groping for a word like electronical. And we instinctively know the difference between an electronics man and an electronic man. An electronic man goes "beep, beep, beep." We inherently know the difference simply because we know something about common sense, and the idiom of the English language -- not because of a rule we were taught in sixth grade.

Incidentally, we can say publications group not because we put out more than one publication, but because our technology is publications, not publication. And also simply because publication group sounds funny.

Other popular non-rules are the new prohibition against the double genitive -- "This old hat of John's." Some would-be purists claim that the "'s" is redundant, because "of John" already indicates possession. Redundant it may be, but it is also good English, since to most people is sounds odd to say "This old hat of John." Or to say "This country of us."

The third class of rules includes those that do indeed have historic antecedent, but are not current today. Strangely, they do not bother us greatly. Not long ago, if we wanted to be correct, we could not legitimately say "I was very pleased." We had to say "I was very much pleased." We could not say "I graduated from college." We had to say "I was graduated," because, logically, the college, not the student, does the graduating.

One hundred years or so ago, purists argued that there was no such word as reliable, because, logically, it meant "capable of being relied," and rely required the adverb "upon." The word reliable thus had to be rely-upon-able

One time at the plant, we had a person in the Reliability Department who was a stickler for grammar. He insisted upon rigid rules. I pointed out to him that reliability was actually an illegitimate word. It was not logical. Therefore, I argued, the name of the department should be changed to the "Trustworthiness Department."

His answer was significant. He said,"I never heard of that." And, of course, that settled it. Most of us are fortunate that there are indeed a lot of rules that we do not need to observe, simply because we have never heard of them. One example is the common ordinary subjunctive mood. All of us use it somewhat "incorrectly" because the rules are very tough to master, and probably were invented later anyway,to codify common usage.

On the other hand, among the rules we do know, any of them can be stretched to the point that they sound funny. How about "It's I," or "Men are taller than we," or"A number of students is absent." These are grammatical traps. Correct though they may be, they will not be used by a good writer.

An experienced writer simply writes around them, serving his reader and himself by bowing to English idiom, and the way we talk.

One historical word that is changing is data. I have always said that it could be either way, singular or plural. But today I am beginning to emerge from the closet and am advocating firmly that the right way, the precise way, the educated way, is "data is." I think that very soon we will consider "data are" to be a pedantic affectation, used not to communicate but to raise a deliberate barrier between the writer and most of the readers.

You have to remember that in super-correct grammar there is a lot of snob appeal. If we say "data are," it sets us apart from the crowd, which is exactly where we want to be set.

Therefore, one of the objects of super-correct grammar is deliberately to make us sound funny, with such expressions as "It cost fewer than five dollars," or "None of the persons is available."

One of the arguments against solecisms is that they distract the reader. I agree. But I also believe that the reader is distracted by supercorrect language that does not observe the conventions of spoken idiom.

I believe, with many teachers of linguistics, that the spoken language is the language. When we are teaching English, we make a lot over the differences between the two, spoken and written -- and oddly we sometimes preach that these differences should be preserved. You would think that our written language is being somehow polluted by our most effective means of communication: human speech.

Myself, when I write, I try -- rightly or wrongly -- to bridge the gap with my reader by trying to make myself sound as though I am talking to him. In other words, I deliberately try to write like I talk.

"Write like I talk." That, of course, is a grammatical "error" in itself. I always ask students what's wrong with it. They reply, "It should be as," but no one knows why.
The answer, of course, is that an obscure rule once said that like cannot be used as a conjunction. Ironically, if you do find someone who knows the rule, you will also find a person who is willing to break it, because she realizes that the spoken language is the language, and she writes like she talks.

But what about the degenerating language?

Well, what about it? Language does change.

You already know about reliability. Also, we seldom hear expressions today like "The house is abuilding." Since about 1870, we have preferred to say "The house is being built" We don't say that language is enjeoparded. We say that the language is jeopardized, ignoring the criticism against "ize" which existed then and persists today. Very few of you would say that you motored to the lake in your auto. You would say you drove out there in your car And what happened to that word omnibus? It is now applied mostly to bills in Congress, when it is used at all. This is a real, tangible decline in the language, but no one weeps over it. Instead,we lament the demise of "data are."

But if we do not observe the rules, how then can we know what is "correct"?

I would suggest that there are two remedies. First, we can simply refuse to fret about it too much. We can sit alongside the scholars and observe how language changes. We in technical writing have a ringside seat. We are right there where the new words come from. We are sitting where the languages of science and technology and computers and psychology and education and business and the military all meet each other in grinding new locutions -- each of these disciplines blaming television for the decline of the language.

Instead of complaining, it is more fun to observe. As students of language, we ought to have pleasure watching it grow and change. And we ought to realize what we all knew, even before we became as educated as we are now, that English is not consistent.

By the way, as students of language, we ought to realize, too, that the common verb ought -- unlike other verbs in English -- has no past tense. Where is our consistency?

The second remedy is this. We can still tailor our speech or our writing to the audience. This is a basic rule and a good one. If we are editing for a research laboratory, we may want to continue to use "data are." If we are teaching high school, or college, we may want to be strict about "he don't." In short, we can continue to observe the distinctions we like, such as the difference between infer and imply, but we do not need to use unnatural idiom, or, worse, we need not invent distinctions which set us apart from the people we are trying to reach.

Words like rise and raise can co-exist, along with got and gotten, proved and proven, both used in their natural places, and we can let other words disappear entirely, like auto and abuilding, without too much regret.

Just as we know that some words get favorable reaction and others do not, depending on our audience, we can tailor our grammatical usage by using our natural sensitivity to people's feelings and be proud of the way we use our language to talk to people who will listen to what we have to say.

Professional Development for the Writer/Editor

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Technical writers face the same rapidly changing work environment that many other professionals face today. Technology is changing so quickly that our jobs as technical writers also must change at the same pace. We must adapt to the needs of the business environment in which we find ourselves working. We face new demands and challenges that change the way we do our jobs and the way people perceive our work. For example:

- The introduction of automated text processing changes the way our offices look.
- The complexity of the technical products we write about makes increased demands on our time and talents.
- The new emphasis on the importance of well-developed technical information changes the way everyone perceives us and the products we produce.

These challenges we face as technical communicators make it imperative that we continually search for—and take advantage of—every opportunity available for professional development. This panel discussion focuses on three aspects of professional development:

- Knowing how to communicate
- Learning the technical material that we need to communicate
- *Being* professional communicators.

These aspects are discussed in the following papers that were written by the members of the panel:

Writers without Technical Backgrounds—What They Can Offer To Technical Information Development, by Meady Thomas and Ruth Warren, discusses the skills that a writer with no previous technical experience can offer to the world of technical writing. These skills are divided into categories that cover such areas as writing expertise, awareness of the total design package of technical information, sensitivity to the needs of specific users of the information, and others. The paper emphasizes that, even though technical products are becoming more complex internally, the information about these products must become easier to use.

Learning the Technical Subject—99 Percent of the Technical Writer's Job, by Barbara Wetmore, is a straight-forward, informative paper about how technical communicators can approach the job of learning everything they need to know about a technical product to effectively communicate this information to the users. Using two categories of learning opportunity—formal and informal—Barbara explores the resources that technical communicators might have at their disposal. These resources include such possibilities as: (1) product design and functional specifications, (2) comments from users, (3) product reports, (4) participation in product tests, and others. This paper emphasizes that learning the technical subject is perhaps the most important part of a technical communicator's job.

Technology Isn't All It's Cracked Up To Be—The Ten Commandments of Professionalism, by Evelyn Knauft, takes a sometimes humorous punch at some hard-hitting facts about being a professional technical communicator. Evelyn makes it clear that technology alone will not make a technical communicator a professional. Her "Ten Commandments of Professionalism" covers such areas as personal appearance and working environment; writing expertise and technical competence; schedules and budgets; and attitude to your job. This paper emphasizes that, as individuals, we are responsible for taking charge of our own lives and making ourselves the real professionals we want to be.

Writers Without Technical Backgrounds: What They Can Offer to Technical Information Development

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ABSTRACT

Many technical information development groups today debate the merits of technical writing backgrounds. That debate centers around the following question, "Who makes the better technical writer - the technician with a technical background or the writer with a writing background?" Because this question has no right or wrong answer, this paper will not try to argue aggressively for one side or against the other. Rather, this paper will examine the technical writer who has a writing background and discuss the skills that such a writer can offer to a technical information development group. These skills are broken down into the following five areas:

- *Writing expertise*
- *Design sensibility*
- *State-of-the-art awareness*
- *People-think capability*
- *End-user sensitivity*

THE CONTROVERSY

Can a person without a technical background write technical books? Can a person not interested in complicated technical details write technical books? Can a person with a technical background write technical books? Can a person not interested in books write technical books? Maybe somebody someday will make the final decision on these questions. Right now, let's avoid the controversy and talk about one area of interest: the skills—the tools—that someone with a writing-related but non-technical background can offer to technical information development.

DEFINING THE WRITER

Before we go on, we should clarify what we mean by a writing-related background. Someone with a writing-related background is someone who has:

- Extensive classroom-training as a writer
- Extensive experience as a writer
- A formal education in a writing-related area such as journalism, technical writing, communication arts, or English
- Some combination of the above.

Writers are communicators. Regardless of the way they have achieved their writing skills, writers are trained in the art of communicating. From local newspaper columnists to scientific magazine writers; from automotive journalists to computer software technical writers; anyone who writes for a living must know how to take unfamiliar source material and *translate* it into understandable reading material. Knowing how to write means knowing how to take a topic, no matter how mundane or technically complex, and grapple with it, study it, and *feel* it, until the writer can transform that topic into something worth reading. A writer with a non-technical background can use this ability to translate complex technical material into useful information.

EXAMINING THE TOOL BAG

Although a writer might bring many different skills to a technical information development group, five areas are of primary importance:

- Writing expertise

- Design sensibility

- State-of-the-art awareness

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- People-think capability

- End-user sensitivity

These skills make up the individual writer's tool bag that we've been talking about. Let's take a closer look at these five areas.

Writing Expertise

Probably the most obvious skill that any writer brings to technical information development is writing expertise. Some people just seem to have a knack for writing—for expressing concepts with the written word. Other people may not have as much innate ability to write but could be well-educated in the art of communicating with the written word. Regardless of how a person becomes a professional writer, the professional writer must have writing expertise.

A writer knows the basic rules of grammar and spelling. A writer knows how to structure sentences not only to make them easy to read but to create a certain mood with that structure. Almost any writer knows how to take complex concepts, break them down into parts, and present them in a logical, understandable way. Writers with technical writing, communication arts, or related areas of experience are aware of writing techniques that enable them to customize their style. They know when to use short sentences for quick easy reading. They know when to use longer sentences to smooth out the reading. They know how to use certain vocabularies for the different types of users. In other words, they can write to a particular audience, whether that audience is of sophisticated systems programmers, or store clerks learning to use a product for the first time. The point here is that someone with the education, experience, and interest in writing, can bring a vast amount of writing expertise to a technical information development group.

Design Sensibility

Since writing groups are becoming information development groups, writers today are more involved than ever with *all* aspects of information production. The scope of the job descriptions for information developers has expanded far beyond the task of writer. Automated text and graphic processing equipment allows the writer not only the capability to write but also to design page layouts, create illustrations and produce camera-ready copy–tasks previously assigned to designers, artists and production specialists. Some writers are responsible for other forms of information development such as help texts, online documentation, and screen design. Because of the expanding role of the information developer, writers need to be aware of all the aspects of what we will call – *information design*.

Writers with non-technical backgrounds have a lot to offer the modern information development group in this area of information design. Because of the educational courses taken and the probable job background, a writer has an increased graphic sensibility. Having accurate technical information is, of course, important, but, if that information is not presented in such a way that the end-user can *retrieve* and *understand* it, the accuracy does not mean much. A professional writer knows how to work with graphics people and book designers to come up with working book layouts and designs. If you incorporate accurate technical information into a pleasantly designed book with informative graphics, you will more than likely have a happier end-user. Writers with non-technical backgrounds can bring increased graphic sensibility and the ability to communicate with graphics people and book designers to a modern technical information group.

State-of-the-art Awareness

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Along with the writing expertise and design sensibility that are attained through education, training, and direct experience, writers with non-technical backgrounds also have a close link to the state-of-the-art of information development. Because the writer's primary interest is in writing (rather than the technical subject), the writer is likely to keep up-to-date on changes and trends in the field. They will tend to read journals and articles, attend conferences and seminars, and participate in organizations such as the STC, because they have an interest in learning more about their chosen field.

Why are these activities a useful tool for the writer? These activities provide the writer a means to communicate with, not only other writers in the information development fields, but also with designers, artists, illustrators, publishers, and teachers. This communication keeps the writer up-to-date on innovative ways to present technical information to the growing masses of non-technical end-users. The writer will be less likely to depend on the common crutches that technical publications have used in the past to convey information: bulleted lists, specification sheets, acronyms, and flow charts, just to name a few.

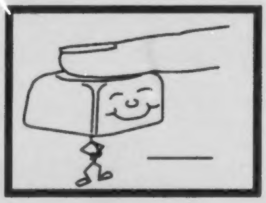
This is not to say that the old writing and graphic techniques no longer have a place in technical publications; but rather that many techniques are being developed and tested that better suit the needs of particular end-users. Writers with a non-technical background can give a technically oriented information development group a state-of-the-art awareness that will help the group produce information that is better tailored to today's end-user.

People-think Capability

Because most writers have a liberal arts educational background, they generally are more familiar with linguistic skills and human logic than technical skills and computer logic. For example, if they are formally educated in some writing-related field, they probably have taken courses in psychology, human behavior, or other liberal arts areas. If they have experience developing information for other people to use, they must know how people react to the information they are using. They know how to put themselves in the place of a user of the information. Understanding the way people think (human logic) and knowing how to communicate (linguistic skills) are skills that enable writers to take technical information based on computer logic and translate it into information that non-technical people can use.

Writers also must know how to teach people to do things by communicating tasks in an orderly, informative way. Often in the past, technical information was page after page of explanations on how a product worked: wordy descriptions and complex diagrams and charts. Perhaps in the early days of high-tech products, this type of information sufficed for the few who created and used the products. This complex and wordy technical information, though, does little to help people learn *how to use* the product. Today, with a growing number of non-technical people using technical information, writers must know how to teach people to perform certain tasks without bogging them down with too much detail. Having a liberal arts background with emphases on psychology, human behavior, and other related fields enables writers with non-technical backgrounds to bring valuable expertise in *people-think* to technical information development groups.

End-user Sensitivity



Just tell me how to use it . . .

A company had an advertising campaign a while back that said something like this: "A product so advanced, it's simple." The recent advances in technology are making the internal operations of the products more transparent to the user. Of course this trend is especially evident in the world of computer technology, both hardware and software. A result of this trend is that the information we provide for these products is *how-to-use* information. People today, more than ever before, want to know how to use something instead of how something operates. As these products become increasingly complex internally, fewer people are able to understand what is going on inside. Often they are not interested in learning. "Just tell me how to use it, not how it operates."

In many ways writers of technical information are end-users themselves. As they progressed from pen and paper to typewriter to word-processing computers, they had to use technical information to learn how to use the new equipment. Also, when they are learning about a new product about which they are writing, they have to sort out what they think will be useful to the end-user (*how-to-use* information). They must not only put themselves in the place of the end-users, but also become end-users. They become the ones who want to know ". . . how to use it, not how it operates." As a result of this process—this end-user empathy—writers with non-technical backgrounds can produce information that the customer can understand and use. Perhaps this thought is at the center of the controversy mentioned at the beginning of this paper. For a technical information developer, does the advantage lie with in-depth knowledge about a product, an overview knowledge about the product, or something in between? In our opinion a distinct advantage lies in keeping some distance between a technical information developer and too much in-depth knowledge about the product.

Writers with non-technical backgrounds *must* ask questions about how the product works simply because they are learning about the product, just as the user will be. They will question things that a more knowledgeable person would take for granted. They won't assume that a user will understand something just because *they* understood it when they wrote it.

. . . and tell me in plain, simple language.

People with particular skills approach their jobs from a different perspective than others who do not have those skills. A common ordinary rock from your front yard probably looks and feels differently to you than to a geologist. An automobile engine looks and sounds differently to the average car driver than to a mechanic. In the same way, the jargon of the technical person looks and sounds differently to the non-technical person. People learn the language of their area of expertise.

Because of the nature of today's highly complex technology, the people who develop that technology have learned a language that is strange and confusing to people who don't know the meaning of the jargon and acronyms they use. This technical language becomes second-nature to those who use it every day. The users of these products, however, usually do not know the language. More frequently today they don't want to know that language. Writers, working together with their technical contacts, are able to translate or interpret this strange and confusing language into clear, concise, easy-to-use information. A writer with a non-technical background can offer to a technical information development group sensitivity to the needs of the end-user of a product.

SUMMING IT UP

Information developers face a special challenge in today's technical marketplace. The complexity of computer technology is increasing, yet so is the demand for simple, easy-to-use documentation. Changing raw technical data into useful information for non-technical people is now similar to translating one language into another, and the technical writer has taken on the role of translator. In this role, writers must understand not only what needs translating, but also how to change the information so that other people can use it. Technical writers with non-technical backgrounds have many of the skills and the perspective necessary to be effective translators. It is those skills that this paper has focused on.

Although some people may consider it a disadvantage to be a technical writer with a non-technical background, this combination can be dynamic in creating the necessary tension a translator of complex data needs. Too much familiarity with the concepts and jargon of the technical world can breed too many assumptions about what the end-user knows. Writers with non-technical backgrounds have a perspective on a product and the product information similar to the people who will be using them. If communication between writers and technical people is open, they can work together in changing the concepts and jargon of the technical world. Writers with non-technical backgrounds can take technical data and study it, determine what the user needs to know, eliminate the unnecessary information, and massage what is left until they can transform it into information that can be understood and used.

Controversial or not, a technical writer with a non-technical background has a tool-box full of important skills to offer to technical information development groups. Technical information development needs these skills.

Learning the Technical Subject: 99 Percent of the Technical Writer's Job

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Most technical writers are equipped with the necessary communication skills to write manuals. But how many of them know and understand the products they write about? Knowledge and understanding of technical subject matter are almost more important than communication skills because without them, writers cannot effectively apply their communication skills. So, how do writers acquire knowledge and understanding about the products they document?

This paper explores several learning opportunities available to technical writers in the product development environment. These opportunities fall into two basic categories: formal and informal. Formal learning opportunities are generally characterized by written source material, such as product specifications and information plans. Informal learning opportunities are less concrete than formal opportunities, but are usually more helpful because they require the writer to actively participate in hands-on learning experiences. Examples of informal learning opportunities are conversations with technical people and participation in product tests.

This paper explains what the various types of formal and informal learning opportunities are, how valuable they are, and the kinds of information technical writers can gather by seeking them out.

You have gotten your assignment. Write this manual. Do it according to these draft and review schedules. Have it printed and available for users by this date.

Now what?

The *only* place to start in the development of a technical manual is in the learning stage. You must know and understand the subject you are writing about or you will not be able to write about it. It is that simple.

Any beginning technical writer with a degree in English or journalism knows the feeling of doubt that comes from being assigned to write a technical manual and having no technical background. Trying to explain a complex data processing procedure armed with only good communication skills and no knowledge of computer science leads to frustration. In fact, it often leads to the deterioration of communication skills. Faced with not understanding what he is writing about, the writer will usually resort to using poor techniques such as employing the passive rather than the active or imperative voice. You have probably noticed that when you do not understand the technical subject matter, you feel safer not committing yourself to your writing.

Unfortunately, many technical writers are in this situation. It should be noted, however, that the criteria for good technical writers are being stiffened. Many colleges that offer degrees in technical communication now require students to take technical courses in addition to their communication courses.

Even so, writers who do have some technical background suffer from the same lack of specialized knowledge about a particular product as their non-technical colleagues. Although they might learn more quickly, they still must learn. Where does the knowledge and understanding of a particular product come from? This paper explores several learning opportunities for technical writers in a product development environment.

Learning opportunities for technical writers fall into two basic categories: formal and informal.

FORMAL LEARNING OPPORTUNITIES

Formal learning opportunities are characterized by structure and visibility. They usually are in the form of written source material; for example:

- Product design and functional specifications
- Information plans
- Comments from users
- Other manuals
- Product reports and memos.

Product Design and Functional Specifications

Product design and functional specifications are probably the first pieces of source material to turn to in the quest for product knowledge. They are not necessarily the most helpful. This is because they are usually written by the engineers or programmers who develop the product, be it hardware or software, and therefore are often difficult to understand, even for other engineers and programmers. The following excerpt from a programming functional specification illustrates this point:

> If the request is for ABC
> and a buffer is available,
> the Mailbox Manager puts

all the information from the
In Mailbox into a buffer in
mailbox format and enqueues
the buffer on a new ABC/1234
Communication Queue. The
Mailbox Manager then sets a
"service required" flag
in direct addressables which
will be used by the Mailbox
Timer Support to determine when
control is passed to the
1234/ABC Communications Queue
Dispatcher.

Of course, product specifications do contain valuable information that is worth struggling to comprehend. In addition to functional descriptions, which are probably the most important elements, product specifications describe what users are looking for in the product; the timetables for developing, testing, announcing, and releasing the product; how the product works with other products; the terminology to be used in describing the product; and how the product will be serviced.

Although they are a good starting point in the collection of learning material, product specifications carry on their usefulness through only about half of the manual development cycle. After that, product functions and designs change and the specifications become out-of-date. Still, their usefulness as an introduction to the product should not be overlooked, and depending on the quality of the product specifications and the kind of manual you are writing, you might use the specifications extensively throughout the entire manual preparation process. For example, the writer of a program logic manual would need and use the detailed information in the specifications while the writer of a general information manual would look elsewhere (probably to product planning or marketing) for most of his source material.

Information Plans

Information plans describe the manuals that will be written to document a particular product. They are written several months before any manuals are even assigned to writers, and therefore are a good place to learn about the product library strategy. In addition to detailed descriptions of the manuals in the library, information plans contain brief descriptions of the product itself, the users who will use that product and the tasks they will perform with the product, as well as critical dates, and objectives for the manuals in the library.

While they contain only general information about the technical product, information plans are still a good source of learning material. As more people in the industry are coming to realize, technical manuals are as much a part of the product as the gears in a machine and the lines of code in a program. Understanding the documentation strategy contributes to your product knowledge.

In addition, although their primary purpose is to describe the strategy for the manuals in a product library, well-prepared information plans can give you a good insight into the product itself. You can determine from the tasks users are to perform exactly what the product is to be used for. Good information plans also go so far as to outline the steps users follow to accomplish specific tasks and subtasks. Not only does this help you understand how the product works and is to be used, but it also provides you with direction for your manual.

Comments from Users

Comments from users are among the most useful forms of learning material you can draw from. These comments might be from draft reviewers, product testers, fellow writers, or customers themselves. The thing that makes user comments so helpful is that they are based on real life situations. Comments from people who use your manual to perform actual tasks give you insight to the ways and environments in which your manual is used. More importantly, they often point out inaccuracies, forcing you to seek correct information and thereby increasing your product knowledge.

Many times user comments are in the form of questions or requests for more information. "How does this work?" "I cannot complete the task with the information you have given me." Comments like these require you to investigate and learn more about the product so that you can respond to your users' needs. You probably would not know the questions to ask in most cases if your users did not give them to you. Sometimes, depending on who the user is, he can not only point out needs in the form of questions, but can provide answers to those questions. Users like these—usually developers and testers—become valuable technical contacts.

Other Manuals

If you are writing about a product that is continually enhanced and requires updated manuals with each level of enhancement, you can learn a lot from the manuals that were written for previous releases of the product. Of course, these earlier manuals will not have any information about the new enhancements, but they are an excellent place to get an overall product background, which you must have even if you are writing an update.

If your product works with other products, existing manuals about those other products often provide valuable information about your product's place and function in its total environment.

Product Reports and Memos

Reports and memos about different phases of a product's development are useful for one main reason. They keep you up-to-date on the product's status. After the product specifications lose their timeliness and validity, you should depend on reports and memos to keep you aware of what functions are really going to be performed by the product. Sometimes new ones are added and intended ones deleted. Also, you should monitor reports and memos for any changes in critical dates, and for announcements of any activities where you might learn even more about the product, such as usability tests and informal classes.

INFORMAL LEARNING OPPORTUNITIES

Informal learning opportunities, while not always as visible or available as formal opportunities, are nonetheless more valuable. This is because they usually involve some sort of active participation on the part of the writer. And one small hands-on experience can do more to increase your product understanding than hundreds of pages of the best-written specifications.

Informal learning opportunities include:

- Conversations with technical people
- Participation in product tests
- Visits to user locations
- Product classes.

Conversations with Technical People

You will probably gain most of your knowledge about the product from simply sitting down and talking to the technical people who work on the product. These include not only the people who develop the product, but the people who market the product, who help install the product, and who service the product—people involved in all aspects of the product.

Two great benefits from conversing with technical people are the lengthy interactions and personal instruction you receive. Someone who understands a process can explain it to you in far less time than it would take for you to acquire the same understanding from product specifications. Another benefit is the exposure you get to other groups in the company. Not only do you become familiar with other environments in the organization, but you also create an identity for yourself in these environments. In addition, you establish long-lasting contacts, some of whom become friends. And learning about the product from your friends is much more effective and less intimidating than learning about it from a set of specifications or from strangers.

In addition to talking to technical people, you should draw upon the experience of your fellow writers. Many times you will find that the writers on a project know more than the product developers themselves. Because of the research nature of their job, good writers are constantly seeking, gathering, and assimilating information about all areas of product operation, while product developers tend to concentrate or specialize in one area alone. Of course, writers who have been working on the project for a considerable amount of time are the best ones to draw upon. New writers, as they seek, gather, and assimilate information, will become sources of product knowledge themselves someday.

Participation in Product Tests

Running almost equal with conversations with technical people in terms of learning opportunity is participation in product tests. Product test environments are about the closest things to actual user environments that you can get before your manual must be in its final printed form. Not only should you be present to observe test participants use drafts of your manuals, you should also serve as a test participant yourself. In this way, you will gain valuable hands-on experience and insight into just how usable your manual is. Serving as a test participant puts you in the place of the user, makes you more aware of his needs, and allows you to write with confidence about procedures you know will work. A great benefit from using drafts of your manual during product tests is that there is usually still enough time in the development cycle to make changes to the manual resulting from test findings.

Visits to User Locations

Visits to user locations expose you to the actual environments in which your readers use your manuals. These kind of visits usually take place after your manual is written and therefore do not provide you the benefit of being able to change the manual if a change is required. However, if your product is one that is continually enhanced and your manual is updated with the release of enhancements, you should not pass up an opportunity to visit a user location. Not only will your receive a lot of feedback, but you will be able to see what your users' needs are and how well your manual fulfills those needs. And if you discover that the manual is not adequate in meeting all the needs of the users, you can correct the inadequacies in the next revision.

Product Classes

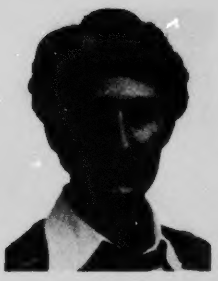
If you are fortunate enough to work for a company that offers classes to its customers, you have an excellent opportunity to learn about the product you document. These classes are taught by professional instructors who are charged with a similar task to you—to teach people how to use the products they have bought. The students in these classes are usually customers of the company you work for; in other words, the users you write for. And often times, the manuals you write are used as textbooks in these classes. Thus, by attending product classes, you not only learn about the product you write about, but you get to observe how your readers use your manual.

Sometimes, product developers will offer more informal classes for people within the company to introduce them to the product. If you cannot attend customer classes, you should try to attend one of the informal product classes. You will not get to interact with your readers here, but you will learn about the product. And usually, these informal product classes are held early enough in the cycle that you can make changes to your manual if necessary.

Successful technical writers recognize the necessity of understanding their subject matter before they attempt to write about it. They also are voracious seekers of information. You should always look for ways, in addition to those discussed in this paper, to learn about the product you document. Do not expect to write even semi-adequate manuals by sitting in your office with a few pieces of written source material and an occasional phone call to a product developer. Only by seeking information wherever you can and by challenging yourself to learn as much as possible about the product you document will you be able to fulfill the ever-growing information needs of present-day and future users.

Technology Isn't All It's Cracked Up to Be— The Ten Commandments of Professionalism

Evelyn A. Knauft



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As technical writers/editors become more involved with advanced technologies, will our status as professionals finally come of age? At a Management and Professional Development seminar at the 30th International Technical Communication Conference (ITCC), the universal problem of lack of consideration as a professional was discussed. Is technology the answer? Technology must not be looked upon as a cure-all for "professionalism woes." It may help, but particularly for persons working in companies somewhat behind in the computer age, it is neither wise nor necessary to wait for technology to aid in the struggle for professional recognition. As individuals we can project a professional image backed up by a solid work record. You hold the key--the following "commandments" show you how to use it.

I. THOU SHALT LOOK LIKE A PROFESSIONAL

Pretend that you are a new employee and take a look around your company. Can you guess who is the president? Who works in the computer center? Who, based on looks alone, is the technical writer/editor? Now, look at yourself and see where someone else would imagine that you fit in the corporate structure. You need to project the image of a professional to be accorded the respect of one. Women, in particular, need to dress the part, as many men automatically assume all women are not professional staff members. Try (for women) wearing a skirted suit, dark pumps, and a tailored shirt the next time you meet with an engineer who typically ignores you. Your authority will come across the minute you walk in the room--and you better have the technical writing skills to back up the image you create! Two helpful sources for Commandment I are The Women's Dress for Success Book and Dress for Success (for men) by J.T. Molloy (1,2). His 17 years of documented research--not his opinions--will convince you that this is not an area of professionalism that can be ignored.

II. THOU SHALT MAINTAIN AN OFFICE WITH A PROFESSIONAL APPEARANCE

Your office is an extension of your personality and your capability. While a clean desk may be the sign of an empty mind to some, if you again pretend to be a new employee and guess the status of other employees based on the appearance of their office alone, you will usually find that the orderly, organized, uncluttered offices belong to the people at the top of your organization, all recognized as professionals. Increased use of computers may help relieve many offices of paper clutter, but it will probably be many years before computer files completely replace paper files. The professional technical writer/editor need not hoard every piece of paper that comes his/her way. Lakein (3) recommends that one way to get control of your time and your life is to handle each piece of paper (defined here as memos, company mail, advertising circulars, etc., and not documents, which obviously must be dealt with several times) only once. Either file it, throw it away, or pass it on. Put a sign on your desk proclaiming "A Clean Desk is the Sign of an Organized Mind." Gain the confidence of the technical staff you work with by presenting an office as well organized as the documents you produce.

III. THOU SHALT KNOW THY GRAMMAR (BUT BE WILLING TO BEND THE RULES)

It sounds so basic, but a professional must be thoroughly knowledgeable in his/her field. If YOU misspell words, use the wrong verb tense, or break any other grammar "laws," your coworkers will fail to gain confidence in you. They will not wait to find out what a terrific writer you are, because they will not trust your ability in this seemingly insignificant, but vital, area.

The flip side of this argument is that lack of flexibility in grammar rules creates a different kind of mistrust. One must, as stated by Sims (4), "...learn to distinguish between changes that (are) necessary and those that (are) simply preferred." The engineers and scientists you work with will assume that you are missing the proverbial forest over concern about a totally unimportant seedling if you focus on nonessential grammar while ignoring technical content. A professional technical writer/editor will ensure that no incorrect grammar is used in a document, but will not insist that rules subject to interpretation go his/her way every time.

IV. THOU SHALT LEARN AS MUCH AS POSSIBLE ABOUT THE DISCIPLINE FOR WHICH YOU WRITE (COROLLARY--THOU SHALT KNOW THY JARGON)

Nothing seems to irritate an engineer more than for a technical writer unfamiliar with the jargon to insist on defining every term used. The engineer will generally explode and say, "But everyone knows what that means." What he/she means, of course, is that "everyone" in that discipline understands the terms. The professional technical writer should continue to insist that the terms be defined if the audience is outside of the engineer's discipline. However, if the audience is of the engineer's discipline, it is unnecessary and annoying to define jargon. By failing to learn the jargon, you label yourself an outsider, a generalist, and not a professional.

Beyond knowing the jargon, the professional technical writer/editor must become something of a technical expert. Practical limitations sometimes hinder the best intentions, as in my firm where I am required to work in as many as ten technical disciplines--time is a major limitation in the degree of expertise I can acquire. However, I have become enough of an "expert" to at least ask intelligent questions of the engineers and scientists in nearly every area in which I work. These technical personnel are much more likely to accord me the respect due to a true professional when I display an interest in and knowledge about their area of expertise.

Besides paying careful attention to the reports which you help produce concerning a particular subject, you can become an "expert" by studying a general text on the field, preferably one with a glossary. In addition, attending "brown bag" seminars and stopping by the office of a technical staff member to chat about his/her latest project are excellent ways to become an expert.

V. HONOR THY SCHEDULE AND THY BUDGET

One sure way to label you and your technical writing department as unnecessary extravagance is to miss a deadline and overspend the document production budget. In striving for consideration as a professional, you must be cognizant of every part of the report preparation process. Turning out a well-written document is not enough to guarantee you consideration as a professional if no profit is to be made because the budget was overspent due to missed schedules and cost overruns. By recognizing the overall schedule and budget, you will be more of a team member and good businessperson, not a misplaced English major with no concept of real-world constraints.

In addition, once you learn to take responsibility for turning out a high quality product WITHIN the proposed budget and schedule, you may have a voice when the next budget and schedule are being established, and prevent future unrealistic budget and schedule demands. You can also aid the project manager in developing ways to spend less time and money while still achieving all goals of the project. According to Carter and Stolgitis (5), 72.9 percent of STC members work for private industry, where the profit motive governs virtually every management decision. It is essential to be aware of the profit motive and how you can improve your professional status by demonstrating your concern for the "Time is Money" adage.

VI. THOU SHALT NOT OVEREDIT NOR OVERWRITE

In modern terms, this commandment could be stated as, "Do not waste time, money, and effort when it will neither be appropriate nor appreciated." Every company has different standards to which it expects its writers/editors to conform. At the environmental consulting firm where I work, time is always of the essence, and the standard for technical writers/editors (in extremely general terms) is to know the client's needs and satisfy them--and no more! Rewriting an acceptable report that presents all information clearly and accurately, if not beautifully, violates the code of private business discussed in Commandment V, i.e., the profit motive reigns. This is not to say that shoddy writing, poorly constructed tables, or sloppily typed documents should be allowed to leave your company simply because the due date is impending. Without a consistent conformance to company standards, clients will not be inclined to repeat business with your firm. Therefore, the writer/editor must be a professional by guaranteeing that only acceptable documents leave the company. However, it is unprofessional and unbusinesslike to make a work of art of every document which crosses your path. Establishing good rapport with the technical staff and with clients whenever possible will enable you to determine the level of editing needed and the type of writing which is acceptable.

VII. THOU SHALT "SELL" THY SKILLS TO THY TECHNICAL STAFF

If you are fortunate enough to belong to a writing/editing department in a firm where you are always appreciated and where your work is acknowledged throughout the company as valuable, proceed to Commandment VIII, thou art indeed more fortunate than thou knowest. The other 99 percent of you must learn to "sell" your skills and those of your fellow writers and editors. Having a strong department where every individual is viewed as competent can only serve to better your professional status, not detract from it. As stated by Thedens (6) in her article, "Gaining the Respect and Confidence of a Technical Staff," the professional writer demonstrates to technical staff how a well-written manual or report improves the product (or whatever your company sells to clients) and can help gain repeat business. Supplying a client with a report on the quality of the wastewater they discharge and how to meet all effluent guidelines does them no good if the chemistry data are not discussed and explained in a logical, clearly written manner. While your company's technical staff may be able to write an accurate (if somewhat unintelligible) description of the wastewater discharge data results, it is up to you to educate the technical staff that your editing of the report so that the intended audience can understand it is vital to gain repeat business. Discuss point by point the editorial changes you have made in the document so that it is no less accurate but much more understandable. After going through this discussion process two or three times with technical staff, you will gain their confidence and will have them "sold" on your abilities as a technical communicator. Sims (4) describes effective ways to dialogue with technical staff.

Another opportunity for "selling" your skills comes when you are fortunate enough to meet clients. Technical personnel will frequently introduce me to clients and describe me as "the person who really gets things done around here and who is crucial for sending out your reports in such fine shape." I urge you, blushing or not, to thank the technical staff member for his/her praise, and then spend a few moments telling Mr./Ms. Client what you do in a little more detail. Describe how you work with technical staff to ensure that the client will always receive well-written, understandable reports that arrive on time and are produced within the budget. The idea is not to take more credit than you deserve, but to educate and "sell" the client on your position as one which is vital to production of an acceptable report. Being recognized as a professional by clients will make your acceptance as a professional by in-house personnel much easier.

VIII. THOU SHALT JOIN STC

I am not among the elected officials of STC, and I do not know any of them personally, so this is not to be considered a paid political announcement. If you ask the engineers, scientists, or other technical personnel in your office, you will find that nearly every person who is considered a professional belongs to one or more professional organizations. The advantages of being an STC member, in particular, for technical writers/editors trying to establish themselves as professionals are numerous. As a member, you attend conferences to share and exchange ideas; you receive "Technical Communication" to learn the newest ideas in the field; you have an opportunity to publish in the journal and in the Proceedings; you have an opportunity to meet people with similar interests and skills at local chapter meetings; and, after attending this 31st ITCC, you have something which you can write about yourself to be published in your company newsletter. Publishing such an article is at once exhilarating and depressing. The exhilaration comes from people congratulating you on your accomplishment and professional recognition. The depressing news is that some technical personnel may say in a rather snide voice that they never knew such a conference or group as STC existed, and what do you talk about at the conference anyway, commas? When faced with the latter response, reread Commandment VII and redouble your personal public relations and selling efforts. On a more positive note, keep several copies of the paper you presented at ITCC handy. You may be pleasantly surprised when technical staff ask for a copy--with those few individuals, you are already considered a professional whose work is worth reading.

IX. THOU SHALT CONTINUE THY EDUCATION

Professionals in all fields know that knowledge concerning their area of expertise increases constantly. To remain up to date, you must continue to learn about writing techniques, formats, technological advances, and other facets of technical communication, as well as continue to increase your knowledge in the technical areas in which you work. Besides attending STC conferences, you can continue your education at a local university or community college and attend workshops and seminars sponsored by private industry and government. Employers frequently encourage continuing education--even paying tuition after successful completion of a course. If your employer believes that the company's money is worth spending on your continued education, be willing to take advantage of that opportunity.

X. THOU SHALT MAINTAIN A SENSE OF HUMOR AT ALL TIMES (OR AT LEAST UNTIL THE DOOR TO THY OFFICE IS CLOSED)

The days of every technical communicator are fraught with the perils of unreasonable deadlines, ridiculously low budgets, poorly written text, and technical staff who expect miracles but do not accord you the respect due to a professional. Tears and anger are best kept at home (or behind that closed office door). A joke at the worst of times and a smile in the best will keep the lines of communication open. Succeeding in the business world means learning how to "take the heat" in whatever form it may appear. Next time you are faced with unbelievable demands from unappreciative people, try a joke to lighten the load. No, you can not smile and make all the world smile with you necessarily, but you will convey the image that you are a professional who has been there before. By exuding confidence that shows that you have been through worse and can succeed in spite of it all, you maintain the standards and humor worthy of those who call themselves professional technical writers/editors.

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New Roles for the Technical Communicator

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Our panel addresses the changing roles technical writers play as technology grows more sophisticated and writers' responsibilities increase. These papers contain practical advice for technical communicators. Both panelists believe that if writers take the initiative during this time of expansion, they will discover challenging and satisfying opportunities.

In his paper, "Practical Writing and Editing Techniques," Edward J. Hallinan is concerned with the writer/editor who must move from editorial activities to those of lead writer. He discusses four kinds of information essential to the production of acceptable draft documents. He then describes the techniques he has found most effective for securing that information. His methods are clear and accessible; writers should find them persuasive and useful.

Joan Knapp, in "A New Role for the Technical Communicator: Member of a Design Team," argues that rather than making writers' skills obsolete, new sophisticated, computerized text processing systems will enable technical writers to become full fledged members of the design team. She sees technical communicators broadening the scope of their activities, assuming management responsibilities, and serving as liason between producer and user. Dr. Knapp talks about the tasks involved in this new role and explains the advantages to both employer and writer.

A New Role for the Technical Communicator: Member of a Design Team

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ABSTRACT

In this paper, a former technical writing teacher describes her new role as a member of the team that is redesigning an online data base used to diagnose and treat computer problems. Topics included in the paper are the benefits this relatively new position offers to the technical communicator and to the organization, the responsibilities associated with the position, and the skills required for it. The author is enthused about her role and encourages other writers to create similar positions for themselves.

INTRODUCTION

Some technical writers and editors have expressed the fear that increasing sophistication of text processing products will render their skills obsolete. My thesis in this paper is quite the opposite: increasing sophistication of computerized systems presents a new opportunity for technical writers to become involved in the creation of those systems. Rather than interpreting a finished product to users, the writer who is a member of the design team acts as a liaison between developers and users while the product is being designed. Further, the writer acts as a liaison among the developers themselves, helping to channel their individual efforts toward the creation of a unified system.

This role has many advantages for the writer who is willing to increase his or her horizons beyond the range of activities traditionally associated with writing and editing. The first advantage is the creative challenge offered by the novelty of the role: since that role is not rigidly defined, the writer shares in the activity of defining it. Second, being a team member involves decisionmaking activities not usually accorded to a writer: a team member can influence the actual design of a product rather than simply explain it to users. And third, the role offers the opportunity to use the entire gamut of communication skills in a wide variety of activities.

Because membership in a design team is a relatively new role for the writer, I am writing this paper to tell writers about the benefits it offers, the responsibilities it involves, and the skills required to fulfill those responsibilities.

BENEFITS

The inclusion of a writer in a design team presents opportunities and benefits to that writer, to the manager of a writing team, to the project in which the writer is involved, and to the organization as a whole. While writers may be chiefly interested in opportunities for themselves, an understanding of their role within the context of the project and the organization helps them determine where to look for such opportunities and also helps them establish the rationale for their presence.

If you are a writer or an aspiring writer, where should you look for a design team or a project team to join? Probably a large corporation offers the greatest likelihood of having projects large enough to benefit from a writer. On the other hand, a smaller company on the leading edge of new development in its field might also offer opportunities. Neither company may yet have realized the advantages to be gained from a writer's presence as an active member of a design project. In that case, you will have to tell management about those benefits. And since you are first and foremost a communicator, you are well qualified to do so.

If you manage a team of writers, you might consider loaning a member of your team to a project for the design phase and as needed during implementation phases. Such an arrangement can yield at least three benefits to you. The writer chosen will gain experience and will return to your fold with a new dimension of knowledge. The project manager will be favorably impressed by the contribution of your writer, particularly if, like many technical people, he or she was not aware of the skills a writer offers. Thus, your department will increase its stature in the technical community. And, finally, your department's task in writing user directions will be made much easier by having in your midst a writer who knows what the designers intended.

Such continuity, provided by a writer, is also beneficial to the project and the organization as a whole. In *Soul of a New Machine*, Tracy Kidder presents a vivid picture of the typical process of designing a new product. The designers are too rushed to document the activities that produced it or the evolutions in thinking that are responsible for its unique features. And when the design phase is complete, they scatter to new projects and often to new companies long before the product reaches its intended users. This time lag creates a communication gap between designers and users—a gap that writers are called in to fill. A resident writer, who has been a member of the design team since the inception of the project, prevents this gap from occurring. Further, because the writer leaves behind a clear account of the design process, the organization can benefit by that account in managing future projects.

"That's all very well," you may say. "Theoretically the benefits to the project and the organization sound very nice. But what concrete benefits can a writer provide that would persuade management to add the cost of another salary to a project?"

I can best answer that question by quoting from an article my project manager wrote, about two months after I was hired, for the newsletter published by Service Delivery Systems (SDS), my directorate within the Field Engineering Division of IBM:

> The Application Architecture project is responsible for designing all the user-oriented applications of the future system. In line with SDS emphasis on quality, we are stressing quality in documentation as well as design. To further this goal, Dr. Joan Knapp, a lecturer in technical writing from the University of Colorado, joined the

Application Architecture team in May.

We felt that, in addition to the obvious advantage of ensuring well-written documents, a writer would give us some other important benefits:

- Clearer communication between application designers and our worldwide user community
- Standardization among the large numbers of documents involved in the project
- Greater productivity

These benefits have been apparent in the documents that we have produced in the past two months. In addition, we are making some changes in our patterns of communication that promise even greater benefits for the project. From the experience of having a writer in our midst who is constantly asking "What does that term mean?", we have discovered that we tend not only to write, but also to speak, in acronyms that are not clear to outsiders, or even to all insiders. Translating these acronyms into standard English is forcing us to sharpen our own thinking, as well as producing clearer descriptions of the applications that we are designing. The result is an improvement in the quality of the entire application architecture process.

RESPONSIBILITIES

Since the three bulleted items represent my major responsibilities to the project, I will explain those responsibilities and the activities they involve.

1. Communicating Between Designers and Users

The system that is being redesigned is an online data base used to diagnose and treat computer problems in all parts of the world. Because of the increasing difficulty of adapting the system to changing business needs, it is being upgraded to meet these needs and also to function more efficiently for the users. Thus, the first responsibility of a writer working on the project is to act as a liaison, helping to explain users' needs to developers and developers' designs to users.

One might think a background in computer science would be necessary to fullfil this function. Not so. Service representatives and customers are not usually interested in the workings of the system that delivers service. But they are vitally interested in knowing what tasks it will do and how efficiently it will do them, and they want that information spelled out as simply as possible. The writer who forces designers to explain that system in non-technical terms is performing a service both to the designers and to the users. Communicative rather than technical skills are required.

These skills are exercised through a variety of activities, including:

1. Attending meetings
2. Writing and editing documents
3. Helping design the video screens the user sees

Placing "meetings" ahead of "writing" may sound perverse, and if you are a writer who regards all meetings merely as intrusions on the time you spend with your typewriter or terminal, then this job may not be for you. I make an effort to attend meetings, technical or otherwise, because only through them can I catch the full flavor of the ongoing project. I ask questions, take copious notes, and sometimes transcribe them. As scribe for the formal eight-hour meeting between developers and users that concluded the first half of the first phase of the project, I condensed forty pages of notes into two and a half pages of minutes that were sent to nine IBM directors, fifty attendees, and people on their staffs. Usually, however, attending meetings involves more listening than writing.

Regarding my second liaison activity between designers and users, writing and editing design documents, the documents are unusual, since the present users of the system are experts in the parts of it that they use. Our documents abound in jargon and acronyms seemingly inconsistent with the principles of good technical writing. Yet, since they address our audience in the language that audience best understands, I believe that they in fact reflect those principles. My tasks as a writer-editor include:

- Writing a highlight report each week
- Writing introductory material
- Arranging text for visual appeal
- Helping designers express ideas
- Correcting mechanical errors
- Clarifying text
- Supplying definitions for acronyms

The last task has proved fairly burdensome, requiring telephone calls around the IBM network to discover the actual words that were the sources of acronyms. When the acronyms were first used, they were understood as short forms for a set of English words, but then they began to be understood as words in their own right. People accustomed to using and hearing them find them useful as communicative tools, but newcomers find them an unsurmountable barrier to communication, a bewildering pseudo-language for which no dictionary is available. The same acronym may have different meanings in different branches of the company. And loss of the meanings of the original words frequently results in absurdities: for instance, "QCM" stands for "Quality Communication Meetings," but people speak of "QCM meetings," which literally means "Quality Communication Meetings meetings." I cannot undo this pseudo-language, but I have complained about it so vociferously that I do not believe the members of our team will be tempted to add further pseudo-words to it.

The other tasks are less burdensome; indeed, for a writer or a technical writing teacher, they are not only familiar but actually fun. If you are a writer, you know how satisfying it is to create order from chaos. Each week I do just that as I summarize all the ongoing activities in the various departments involved in the architecture project into a one-page highlight report. Then, presto! With one succinct command, I send the report over our internal network from my terminal to the terminals of forty people located in all parts of the country and the world. I feel a similar satisfaction when I write introductions and arrange text for visual appeal. Not only are these creative activities, but they reaffirm the principles that we technical writing teachers have taught our students. Indeed, if you are a writing teacher, you will find many of the activities related to membership in a design team a repetition of familiar activities in a new and exciting "real-world" setting. You have helped students express ideas; helping designers express ideas is much the same. While you may not have actually written introductory material for your students, you have told them what is needed. You have told them how to break up their text with headings and white space. And, goodness knows, you've corrected plenty of mechanical errors! You have also clarified a great deal of text, and you have learned through questioning how to differentiate between technical material that can be expressed in standard English and material that requires its own language. The 70-page survey we sent our users required some of each: standard English for the prefatory material explaining the purpose of the survey and the procedure for completing it, and highly technical language for the facilities and functions we were surveying.

The third area of communication between designers and users is helping to design formats for the video display screens of the new system. Although the science of screen design is in its infancy, a great deal of material has been written on the subject by human factors specialists and others, both inside and outside IBM. Work within IBM has been concentrated on building a common vocabulary and defining standards that can be applied to all IBM products. Sifting through all the documents that have resulted from this effort could be a major undertaking for the programmers who are designing the system. For a person who has done graduate work in the humanities, however, reading and absorbing these documents is a relatively minor task. Again, if you have an academic background, your research skills can be useful in a technical project. Also, I believe that lack of familiarity with computer systems can be an asset in screen design. If you have no preconceived ideas about screens, you are able to put yourself in a new user's position and to envision what that user wants to know and how the information should be displayed. For screen design, as for the other tasks you can perform to promote communication between designers and users, what you need is not a high degree of technical knowledge but rather the basic communicative skills of absorbing material, defining your audience, and shaping what you design and write to meet that audience's needs.

2. Standardizing Documents

In a sense, standardizing documents is also a means of promoting communication between designers and users of the new system, since users are vitally interested in these documents. But other groups are also interested in them: management, other departments affected by the new system, technical writers who write user documentation for the system, and designers of other systems. For all groups of readers, standardization of format, literary style, and editorial style is essential.

Fortunately, formatting and editorial style have become standardized throughout IBM. I say "fortunately," because even when an editor may not entirely agree with a format or with a stylistic convention such as hyphenation policy, I believe uniformity throughout a document and among related documents serves the reader's interests better than innovation. I have also found my authority as an editor strengthened by a set of guidelines that I can cite to resolve disputes.

Standardization of literary style is more difficult to achieve, particularly when many authors are involved in writing documents. Again, knowledge of an external set of guidelines is essential. If you have an academic background, you will have become accustomed to quoting these rules to students. You will realize that an editor who explains a change in the position of a phrase by saying that the revision "sounds better" fails to establish confidence in the editorial function and may have the change rejected. On the other hand, the editor who can cite the rule that a modifying phrase should be placed as close as possible to the word it modifies gains acceptance for the change.

Ideally, authors and editors work together on a basis of mutual respect. Most authors are intelligent and open-minded. Often they want to improve their writing style and are genuinely interested in learning principles that will help them do so. An editor must be equally open-minded and must not make capricious changes. Technically oriented people sometimes have difficulty expressing their ideas in words. Therefore, as an editor I take care not to propose unnecessary changes.

3. Increasing Productivity

My third and final area of responsibility is to increase the productivity of the people engaged in the project. Activities related to this function include:

- Participating in project management activities such as task planning
- Discovering and distributing sources of information to help designers in their research
- Coordinating project activities such as compiling a dictionary of data elements and keeping workbooks
- Exerting source library control over department disks

IBM places great emphasis on planning the tasks ahead. This planning normally includes such activities as defining tasks, estimating how long they will take, dividing them among team members, and making timelines for members. Our project is unique in being so large that it is divided into six subprojects that must progress independently but must also work together to encompass the applications for the new architecture. Thus, task planning also involves correlating subprojects so that they will finish at the same time, and providing accurate projections as to exactly what will be done at every point in the project. At the time I joined the project, we had team members to plan only five of the six subprojects, so I planned the sixth. This job was not even remotely connected with writing, but it had to be done by a deadline, and there was no one else to do it. I believe that doing it increased my stature with team members, and I found the various activities fascinating. The incident points out that an information developer, as IBM entitles its writers, must be prepared to do more than simply write if he or she is functioning as a member of a design team.

The second and third activities, tracking down sources of information for other people and coordinating group projects, are also somewhat remote from usual writing-editing activities. But these activities have proved to be interesting and highly educational. Researching sources of information, an early activity, provided me with an understanding of the present system and a vocabulary I needed to communicate ideas about the future system. This vocabulary was in turn essential to the group project of compiling a dictionary of data elements, a vital document in the redesign process. As for the workbooks, the purpose of these journal-type documents is to provide a place where researchers can record all pertinent information they gather from reading and interviews, all ideas they formulate about the new system, and details about activities they undertake to gain information and ideas. This information is jotted down in any form understandable to the programmers who are doing the research, the rationale being that it is important to save all information, even though it may not appear immediately useful. The workbooks are based on a skeletal form that I set up on the department disk. Each team member has copied the form on his or her own disk and enters items of information, as they are gathered, into appropriate slots. The skeleton thus serves to guide research and to provide uniformity not only for present readers but for future readers who may be interested in the method of the project and the basis for the design of the system.

Finally, my fourth activity, exertion of library control over disks, sounds very easy. In fact, it was the one responsibility I was initially unwilling to accept. Library control means that I have authority to update disks: team members bring changes to me, and I add to, delete from, or overlay existing text accordingly. Since I had no experience with computers, much less an understanding of the VM system, I was afraid I would accidentally destroy information. With practice, text processing has become an activity I can do well enough to survive; yet the system has such potential that it offers a virtually limitless area of learning.

SKILLS

If you find these activities challenging and can envision yourself as a member of a design team, I would suggest you need:

- Technical writing skills supported by a theoretical background in English. As a technical writer you must be sensitive to the needs of your reader and the wider needs of the project and the organization. And to win the respect of the technical people you work with, you should be an expert in your own field.
- Copy editing skills, again supported by a knowledge of your organization's style guide. You must also genuinely respect the writers whose copy you edit.
- Oral communication skills—the ability to listen and to question. You have to ingest a great deal of technical information; and while you do not necessarily have to understand it completely, you have to distinguish between what can be translated into standard English and what cannot. You also have to be willing to make "wrong" translations and have them corrected rather

than accept jargon.

- Most of all, a naturally curious mind, the foundation on which your skills operate. You must have the desire to learn and the willingness to be taught, the open-mindedness to undertake tasks not normally considered part of a writer-editor's job, and the perserverence to keep asking questions. The mind-set needed might be described as a combination of humility and assertiveness.

I have great hope for this new avenue of technical communication. I think it has the potential not only to open up new vistas for writers but also to change the way management thinks of writers and writers think of themselves. We know we have a great deal of potential that is often untapped in our current roles. With a set of new roles that we ourselves define, we have the opportunity to release that potential and to exert our intellectual and imaginative capabilities to improve not just communication about products but products themselves.

Practical Writing and Editing Techniques

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ABSTRACT

Technical writing and editing involves more than a knowledge of style and format. Often a draft must be prepared from existing documents and edited for content as well as style. A practical approach to writing and editing tasks includes increasing writer/editor exposure with cognizant personnel, researching source and legal documents, participating in project meetings, and reviewing the document by checking for inconsistencies and selectively questioning the contents. This approach will help the writer/editor prepare a reasonably accurate, politically acceptable document with a minimum of supervision.

INTRODUCTION

Writing and editing, like any other professional field, has theoretical and practical aspects. The theory includes a knowledge of style, English usage, format, and document production techniques. These are mandatory requirements much as mathematics is to an accountant.

But effective writing and editing involves more than a knowledge of style and format. Often the writer/editor has to prepare a draft from existing documents or critically edit the document for content as well as style. Usually the writer/editor is expected to generate reasonably accurate, readable drafts that will stand critical review and approval. All this must be done with a minimum of supervision and within impossibly short deadlines.

So there you sit at your desk with your paper and pencil in hand and a 40,000 word index, Webster's, and Chicago on the shelf awaiting a job. Suddenly, your boss walks in and says

> "We need a procedure written on starting up the Secondary Steam System in Plant 2. The lead engineer is too busy with the plant environmental impact statement right now, and an NRC inspection is coming up. You'll have to work on this yourself and I need a rough draft on my desk for review in a week."

How are you going to get the job done?

PRACTICAL TECHNIQUES

This presentation will cover some practical techniques to approach that type of situation. The techniques are general and will not describe in detail how to write nuclear plant procedures. Rather they are an approach to the problems associated with practical writing and editing. The techniques fall into four general categories: exposure, research, participation, and review.

Exposure

What does exposure mean? In this context, exposure is getting to know your potential authors, reviewers, and customers. On a typical engineering task you should know the

- Responsible manager
- Reviewers
- Authors
- Project team members
- Greyhairs.

Each has a different stake in the outcome and a different approach to his own task. Of these people, the responsible manager and the reviewers are generally the most important. The responsible manager has the overall picture of the project and the final approval for the document. The reviewers are usually experts who check the document for technical accuracy for the manager. Without either approval, the document will not be published. Knowing the types of information and writing styles that they are looking for will help you better fit the document into a mold that will be accepted and will enable them to concentrate their attention on items other than writing and editing.

The author has a different viewpoint. Most authors are more concerned about the technical soundness of their writing than the potential use of the document, especially if its purpose is political or promotional. This difference of opinion is natural and justified, since any document should be technically sound as well as correct in purpose. On many projects, the authors are members of the project team, since large documents are often written by committee.

The "greyhairs" are the people within the organization who have been around long enough to know how the organization or process really works, not how it is expected to work. These people can provide invaluable assistance in the form of quick informal reviews of drawings or technical aspects, or by telling you who to see to get accurate information fast.

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Increasing your exposure is a two-way street. It enables you to become familiar with the needs, tasks, and backgrounds of the people you work with, and they with yours. Remember, you are the document coordinator and by knowing the other people involved in document preparation you can help the author retain the level of detail and support he needs, provide the information the reviewers need, ensure the document purpose is always clear, and make sure the language is acceptable to the responsible manager.

Research

Research is a very important aspect of any writing task and often involves extracting information from both source documents and legal documents. For example, if a company had to do three different environmental impact statements to cover three different processes they were going to test at their plant, information such as geography, population statistics, geology, existing environment, etc. could be repeated in all three documents. Thus it will make your job easier if you are very familiar with the major source documents of your customer. I'm not talking about every technical report but rather the "bibles" such as

- Environmental impact statements
- Safety assessments
- Technical specifications
- System design descriptions
- Operating and maintenance manuals
- Facility master plans
- Program plans
- Resource manuals

to name a few in engineering areas. These documents not only contain a lot of detailed information about specific activities but also provide a different viewpoint for those activities, and all of them require extensive review and approval.

For example, the technical specifications for a nuclear power plant represent a legal contract with the government to ensure the safety of reactor operations. Thus, the emphasis is on safety, not on keeping the plant operating. In the document, each parameter that affects reactor safety is defined, its limits are set, and the background information is referenced. All pertinent information is closely controlled both in wording and administrative details such as where the references are physically located and what to do if the limits are exceeded. The approvals are extensive and, legally, not even one word can be changed without proper approvals.

Using the exact wording of these "bibles" whenever possible will ease the approval process. Sometimes, topical reports can also contain approved wording and diagrams. However, in addition to using approved wording, care must be taken to remember the purpose of the document. The conservatism of an environmental impact statement and its emphasis on specifying every potential accident would not be appropriate for a program plan whose purpose may be to convince the government to fund a project.

Participation

The third category of techniques is participation. This means to involve yourself in as many aspects of the project as possible, such as attending project and schedule meetings, as well as preparing the document.

During the lifetime of a project, several meetings are usually held that cover various topics. Some of these types of meetings are

- Schedule
- Budget
- Design review
- Peer review
- Status.

All of these meetings contain some useful information and almost none of them are directly concerned with the document. No one should attend all of the project meetings; that would be a waste of time. But by selectively attending some of the most important status and review meetings you may be able to pick up valuable information you can use in your own document review and preparation, and establish yourself as a member of the project team. Also you can make your resource and schedule needs known early so that you can manage your work more effectively.

It is unfortunate, but today's writer/editor is always faced with a dilemma. Every aspect of a technical project requires approving plans or publishing results, yet paperwork seems to be the least palatable of all of an engineer's tasks. The engineer/author of the document may concentrate on the technical tasks and write down a few words near the deadline. Since he is in a hurry, he will write in a fashion he is used to, heavy on technical details. Then he will question every change you make because he is afraid you might change the meaning. Your job is further complicated since there are usually other projects with similar deadlines, and maybe you will have to do other jobs because your organization is getting loaded down with work. This will affect the time and depth to which you can work on any one document.

A better way to approach a writing/editing task is to actively pursue early involvement. Ask to attend some project meetings. Talk to the author as soon as possible and write an outline when you know the document purpose and the type of information the responsible manager and reviewers require for approval. This approach will define document limits and direction. It will guide the author on the level and type of detail to include. It will guide your edit and review because you will have a clearer idea of what the author and approvers want out of the document, and you will be more familiar with the subject matter. Best of all, you will be better able to make use of your own organization's resources since you will be participating in the schedule process.

If you have to write the document yourself, there are four approaches you can use to save time and not sacrifice accuracy. First, don't break new ground unless absolutely necessary. Original writing is the most time consuming of your tasks and should only be done when no accurate and timely written information is available. Second, remember to use the "bibles" for source information. They have already been reviewed for technical accuracy and political acceptability. Third, write a rough draft early and get it reviewed. This will keep the document purpose on track and help to identify soft spots. And last, think about what the manager and reviewers expect of the document. This will ease the document through its long review and approval phase.

Review

The review phase of a document usually has an informal as well as a formal portion. The formal reviews occur towards the end of the project where major problems will be traumatic. Informal reviews begin early and continue through the life of the project. It is in these informal reviews that the writer/editor can perform a very useful service. It has been my experience that the writer/editor is an important part of the review process.

You can help to discover most of the major and minor problems by reviewing the document for inconsistencies and by selective questioning. When reviewing for inconsistencies, check all portions of the document for

- Expected contents from outline
- Inappropriate wording for audience or purpose
- Logical inconsistencies
- Discrepancies in calculations
- Discrepancies in wording between sections for the same topic
- Incomplete information or unpublished references.

Then scan the document alongside the source documents it was generated from and check words and numbers.

Selective questioning is a technique that can be developed by thinking about the document, its purpose, and what it should contain to fulfill that purpose. Review the document and check

- Support for results or calculations. Does there appear to be enough information there to make the results seem reasonable? Does the information cited actually appear in the reference?
- Calculations. Check a few calculations and unit conversions. Can you logically follow the equations so that the reader will be able to obtain the same result? Are important assumptions and parameter values explained and referenced?
- Less-than-positive phraseology. When the author is uncertain, this uncertainty will creep into his writing. While this is not necessarily bad, it could identify soft spots that may turn into problems later.
- Diagrams. Are there enough diagrams for complicated processes? Do they make sense? Are they accurate? The accuracy can be checked by comparing them with what they are supposed to represent.
- Timeliness of information. If the document schedule is long, some of the earlier calculations, results, or diagrams could change considerably. Or perhaps other groups are updating the "bibles" or source documents you used.

As with any of the techniques of practical writing and editing, the reviews can be most helpful when done early. When you have enough information or a rough draft, ask a few people (perhaps the "greyhairs") to review it for content.

As an aside, it is especially important in selective questioning to maintain an inquisitive, interested, and nonthreatening attitude to create a helpful rather than antagonistic atmosphere. After all, your purpose in the review is to help produce a better document, not to technically attack the authors or question their motives.

TECHNIQUE APPLICATION

If writing/editing situations were ideal, there would be enough time in each project to establish contact with all the participants, research the subject matter and existing documents, participate in all project phases, and help conduct a comprehensive and timely review cycle.

But what about the writer/editor left with the job of preparing the procedure for starting up the Secondary Steam System in a week? By that time, it's too late to be establishing contact or participating in all project phases. The best approach under tight deadlines is to scan source and legal documents for useful information written in acceptable wording. In the case of a startup procedure, a system design description would be useful. Perhaps another plant has a similar system made by the same manufacturer; their startup procedure could be used as a model. Then prepare a rough draft as soon as possible in accordance with established outlines, and get it reviewed by knowledgeable people. Review it yourself for inconsistencies with other procedures, and make sure the contents agree with approved documents. So when there isn't enough time, the research and review phases should be emphasized as well as the document preparation techniques in the participation phase.

SUMMARY

Documentation is an important part of any technical project. The document explains the project history and purpose, the approach to achieving the purpose, the results, the implications of the results, and the possible need for follow-on projects. If the paperwork system worked as it should, and time and budget constraints were much less important than results, the project engineer/author would have the desire and time to prepare a rough draft of the document early. Then the writer/editor could apply the proper style and format and not have to worry about content and purpose other than how they affect style and format.

But in reality, the writer/editor has to do much more than apply style and format. Sometimes, his tasks include original writing and research for the entire document. The practical situation can be improved by applying the techniques of increasing exposure, conducting document research, participating in all project phases, and conducting a comprehensive review cycle. This approach will help the writer/editor prepare a reasonably accurate, politically acceptable document with a minimum of supervision. In addition, it can help the writer/editor become part of the professional project team and increase his knowledge in all phases of the project.

Writing in Response to a Changing Environment

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The technical writer in a large computer company is often insulated from what could be called the "real world of computers." Unfortunately, the technical writer's primary source of information is usually the unintelligible programming or engineering specification written by those who, like the writer, are far removed from the people who use the product. As a result, the technical writer forms some cloudy image of what it is really like "out there." The characteristics and requirements of his audience are never really known or understood.

At home, the technical writer might read in *Time* magazine that the computer age is upon us, and, that soon, every secretary and school-age child will use and own one. From magazine and television advertisements, he sees that like the pocket calculators of the 70s, the computers of the 80s are dropping dramatically in price and giving more and more function. And by necessity, manufacturers are careful to design computers that are easy to use and operate–as easy to install and run as an electric blender.

Looking back at the documentation for the old-iron systems, technical writers see that what was grudgingly acceptable yesterday just will not make the grade today. If secretaries and schoolchildren, already wise to the world of computers, are to be tomorrow's programmers and consultants, changes must be made in the way information is developed and presented. Today's audience will not accept a hodge-podge of voluminous reference manuals and unusable operating guides. The following papers describe some of the ways the Information Development Department at IBM in Rochester, Minnesota changed its writing style and book design to meet the needs of an ever-changing audience.

As computers become less expensive and sophisticated, the customer is expected to perform certain tasks, such as installation and problem determination, that were in the past performed by a service representative. These tasks must be documented in such way as to be easily referenced and easily followed. In his paper *Organizing Computer Manuals on the Basis of User Tasks*, Robert Waite contrasts the product-orient IBM System/34 library with the task-oriented IBM System/36 library. His paper illustrates how a task-oriented library can improve the usability of information, and ultimately, the usability of the computer itself.

In the technical writer's efforts to make his information as easy to use as possible, he must adhere to a vocabulary consistent with that of his audience. Consequently, tools must be developed that allow the writer to verify that he has in fact used consistent and understandable terminology. Timothy Dykstal, in *Living With a Limited Vocabulary*, describes how such a tool was developed and used to keep information at an eighth-grade reading level, a standard that is becoming accepted in business and in government.

Examples within a product library also must be consistent and understandable. And beyond that, they must be accurate, and they must be relevant to the user. Daniel Winter and Norman Holden, in *Creating Better Examples for Computer Manuals*, describe how to develop a fictional enterprise that can be used as a source for sample data, programs, and scenarios used by all manuals within a product library. When the technical writer is supplied with data and an environment similar to that of his users, and when he is expected to become proficient in the use of the system he documents, he is better able to produce verifiable and representative examples.

Organizing Computer Manuals on the Basis of User Tasks

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ABSTRACT

Too often, computer manuals are organized on the basis of product characteristics. As a result, the responsibility for applying these product descriptions to the users' tasks falls on the users themselves. But the less knowledgeable and less experienced the users are, the more they need an explanation from the manuals. Clearly, product-oriented manuals contribute to the attitude that computers are difficult to understand and use.

The alternative to product-oriented manuals is task-oriented manuals. Task-oriented manuals present only information needed for specific data processing tasks, in the sequence that the information is needed, without any theoretical or unrelated information. Writing task-oriented manuals requires more planning and a greater understanding of the users' tasks than writing product-oriented manuals, but it makes the information much more useful. This paper explains how several computer manuals were improved by organizing the information on the basis of user tasks.

INTRODUCTION

Product-Oriented Manuals

Until recently, almost all computer manuals were reference books. Their purpose was to explain how the product works, and they fulfilled this purpose by providing a catalog of product characteristics.

The main reason that manuals were organized on the basis of product characteristics is that product specifications–the writer's primary source of information–are organized that way. The writer finds it expedient to merely edit the specifications provided by the engineers or programmers, especially when those people must approve the writer's draft before it can be published.

For some readers–those engineers and programmers, for example–product-oriented reference information is appropriate and sufficient. For less knowledgeable and less experienced readers, however, it is not. For those who have no interest in learning anything about the product except how it can help them get their job done, such information is frustratingly complex and frequently incomplete. It tells "what is" in tedious detail, but it doesn't tell "how to."

In response to requests for more how-to information, the writer might claim that the company's education courses exist for that purpose and note that the courses are listed as prerequisites in the preface to the manual. Unfortunately, recent surveys reveal that few customers ever take any company education courses and that even fewer customers ever read the prefaces.

How then do they learn to use the product? Inefficiently, slowly, and expensively. By on-the-job training from more experienced coworkers and by frequent calls for assistance from the computer company's sales and service branch office.

Clearly, product-oriented manuals contribute to the attitude that computers are difficult to understand and use. As computers become less expensive and the number of potential first-time users increases, there is a significant economic incentive for eliminating that attitude.

The solution to the problem is task-oriented manuals in addition to–not instead of–product-oriented manuals. Product-oriented manuals meet the needs of experienced users for reference information, and task-oriented manuals meet the needs of novice users for tutorial information.

Task-Oriented Manuals

Organizing manuals according to user tasks requires first defining the tasks, then providing the information needed to perform those tasks. The information must be complete and must be presented in the sequence in which it is needed.

The information needed depends on the reader's previous knowledge and experience, but it never includes information that is unrelated to the task. A person learning to drive a car may need to be told how to steer or shift gears, but not the theory of internal combustion engines or the specific details of how the carburetor controls the mixture of gasoline and air. Similarly, a programmer who wants to write an accounts receivable program may need to be told how to write the instruction to read records from a file, but not the theory of double-entry bookkeeping or the specific details of how the access mechanism electronically transfers bits of data from disk storage to the processing unit.

The test of whether the information meets these objectives is whether the intended user, using only that information, can successfully complete the task in a given amount of time. Using this test, the writer can easily determine what information to include in the manual and what to omit from it.

There is a price for these benefits, however. Writing task-oriented manuals requires considerably more planning than writing product-oriented manuals. That planning involves deciding which tasks to explain, how finely to subdivide the steps of each task, and what to assume about the reader's knowledge and skills. Task-oriented writing can also require more pages, because it makes explicit what is only implicit in product-oriented writing and because a single task may involve information about more than one product.

CASE STUDY

Recently, IBM introduced the System/36 as a successor to the System/34. One of the improvements made in the new system is the task-oriented set of manuals. Among the tasks that required significant changes in the way we present information are:

- Planning for the installation of the computer
- Creating displays and menus
- Using programming languages and utilities

Planning for the Installation of the Computer

System/34

The System/34 planning information is written primarily for IBM sales representatives and hardware service personnel rather than for customers. The intended readers are trained and experienced in helping customers install and use computers, so the planning information is limited to specifications and general instructions. The specifications include the physical, electrical, and environmental requirements for the system. The instructions are essentially checklists of major tasks for installing the hardware and software. The tasks are not explained in detail. For example, one task is to organize a data communications network to allow people at separate locations to use a single system. The instruction is simply "Complete the network diagram." The assumption is that the reader knows how to complete that task.

System/36

The System/36 planning information, on the other hand, is written for customers. The information is much more detailed and complete. Each task is identified as being optional or required and is divided into specific subtasks. It is organized into four planning paths because the amount of planning required depends on the customer's planning experience and on the optional planning tasks for the individual system.

The planning information is packaged in a binder labeled *What to Do Before Your Computer Arrives*. The binder contains eight booklets and some blank planning forms. The first booklet, called *Your Guide to Planning*, provides an overview of the major planning tasks. Like a road map, it helps the reader chart a path through the other seven booklets, which are workbooks for individual planning tasks:

- *General Planning Activities*
- *Preparing a Place for Your Computer*
- *Planning to Set Up Your Computer*
- *Planning for Data Communications*
- *Planning for System Configuration*
- *Planning for System Security*
- *Preparing to Receive Your Computer*

By carefully defining the tasks and subtasks, by providing examples that show the reader how to complete each subtask, and by using flowcharts, drawings, and color to highlight important points, the System/36 planning information enables the customer to plan for the installation of the system confidently and successfully.

Creating Displays and Menus

In a typical interaction between a person and a computer, the computer shows a menu (a list of options), the person selects the desired option, the computer responds by showing a display related to that option, the person enters more information, back and forth, until the person's work is done. Thus, displays and menus are an essential part of this interaction.

System/34

Displays and menus are created by programmers as part of their programs. System/34 programmers who want information about creating displays and menus have to look in four manuals:

- The programming concepts manual explains general guidelines to consider when designing displays and menus.
- The reference manual that lists all the control language commands tells how to fill out the specification forms to create or change the displays and menus.
- The reference manual for a utility program tells how to enter the coded specifications into the computer. (After entering the coded specifications, the programmer must return to the control language reference manual to find the instruction that compiles the specifications.)
- The reference manual for the programming language provides examples of programs that use displays and menus.

System/36

Such scattered information is obviously inconvenient for the reader to assemble and integrate. Therefore, System/36 has a new manual called *Creating Displays* that takes the reader step by step through the tasks of designing, creating, deleting, updating, and using menus and displays. This information, presented in the form and sequence that are most useful to the reader, contributes to the perception that the person is in control of the computer, not vice versa.

Using Programming Languages and Utilities

System/34

The System/34 programming language and utility manuals are essentially reference information. Their titles say so; for example:

- *BASIC Reference Manual*
- *COBOL Reference Manual*
- *Data File Utility Reference Manual*
- *Source Entry Utility Reference Manual*

System/36

The gerunds in the titles of the System/36 programming language manuals emphasize the continuous nature of the tasks that they describe, and the titles of the utility manuals indicate that they contain essentially how-to information. For example:

- *Programming with BASIC*
- *Programming with COBOL*
- *Data File Utility Guide*
- *Source Entry Utility Guide*

The programming language manuals describe both the universal tasks of programming and the specific tasks unique to the particular language. The universal tasks of programming are:

- Designing
- Coding
- Entering
- Compiling
- Debugging
- Running
- Testing

The specific tasks include using various types of files, using arrays and tables, and using indicators. Both the universal tasks and the specific tasks encompass several subtasks that can often be subdivided still further. For example, the *Programming with RPG II* manual contains a chapter called "Using a Disk File." That chapter is divided into three sections because a disk file can be organized in one of three ways: sequential, direct, or indexed. Each of those three sections is subdivided into four parts that explain how to perform the four subtasks related to disk files:

- Creating a file
- Reading a file
- Updating a file
- Adding records to a file

Each of those four parts is further subdivided into more detailed information about the various ways in which to perform the subtasks. For example, the part titled "Reading a Sequential File" is subdivided into the following subparts:

- "Reading Consecutively"
- "Reading Randomly by Relative Record Number"
- "Reading Randomly by Relative Record Number and/or Consecutively"
- "Reading Randomly by Address Output File"

Similarly, the utility manuals are organized on the basis of user tasks. For example, a person can use a Data File Utility (DFU) program to do the following tasks:

- Enter a file
- Update a file
- Inquire into a file
- Print a file

Therefore, the chapter headings in the *Data File Utility Guide* reflect those tasks:

- "Setting Up DFU Programs to Enter or Update Files"
- "Using DFU to Look at Data in Files"
- "Creating DFU List Programs to Print Reports"

CONCLUSION

Computer manuals organized on the basis of user tasks make both the computer and the information easier to understand and use. For experienced users, they provide a conceptual framework for the information that the users already know. For inexperienced users, they are not just nice to have; they are a necessity for getting the job done.

Living with a Limited Vocabulary

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ABSTRACT

Manuals for small computers must be understood by an audience that is technically unsophisticated. The vocabulary chosen for these manuals greatly affects their readability.

This paper discusses IBM Rochester Information Development's implementation of a limited vocabulary in the presentation of technical information. A task force created a project-specific word list, based on an established, commercially available vocabulary with a restricted (eighth) grade level, and established criteria for making exceptions to the word list. A substitution list, which contains alternatives for common technical terms that are above the grade level, and a master glossary, which establishes definitions for terms that do not permit substitutions, accompany the word list. The list was automated to make it easier to use.

INTRODUCTION

Like a maturing child, the technical writer must live within certain limitations. He writes to instruct, not necessarily to please himself, and a basic restriction he faces in doing so is on the words he uses. The subtle distinctions of meaning that may be lost through this restriction are more than made up for in improved readability (and subtlety is not the business of technical writing anyway). Readability formulas and vocabulary inventories are thus commonly available to the technical writer; the difficulty lies in their implementation, especially across an entire project. Given initial resistance, convention, the variety of writing styles and work habits, and always schedules, how can a limited vocabulary be made to work?

THE LIVING WORD VOCABULARY

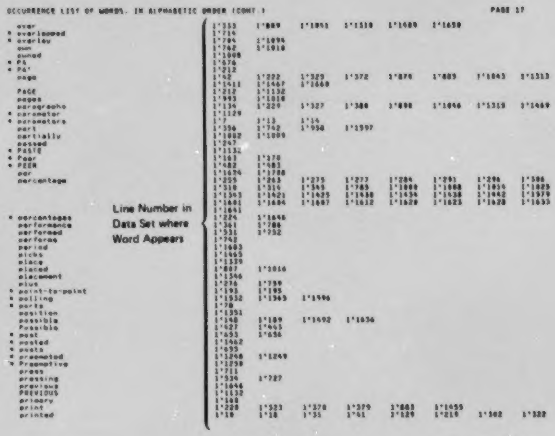
IBM Rochester Information Development's reference in this effort is the Living Word Vocabulary (LWV), by Edgar Dale and Joseph O'Rourke (Reference 1). The LWV contains 44,000 words, each listed by the highest grade level (from 4 through 16) at which it could be recognized by at least two-thirds of the students tested. In the Introduction to the LWV, Dale and O'Rourke suggest that their list may be of special use to those particularly interested in defining readability levels, like the writers of "public documents" and textbooks (Reference 1).

Information Development writers at IBM Rochester had a similar need to measure the difficulty of their computer manuals, but depending on an unwieldy list of 44,000 words seemed practically impossible. The primary restriction on the complete LWV, then, was to use words only at or below an eighth-grade level. Through an audience analysis, this was judged to be the level of the least-sophisticated reader of IBM Rochester manuals: the operator who runs computer applications but has not necessarily written them. The decision was made to retain these readers at the risk of "talking down" to the more experienced ones. Yet even this grade-level restriction did not make the LWV manageable to the writer busily concerned with technical accuracy, ease-of-use, and style as well as readability. Because the LWV was developed for all kinds of writers, it contains thousands of words that would never be used in a computer manual, and omits other new technical terms that are peculiar yet familiar and necessary to computer users. Information Development writers needed a way to customize the LWV further.

CUSTOMIZING THE LIVING WORD VOCABULARY

Previously, at another IBM location, an Information Development group had edited the LWV, adding to it when necessary, for the words they thought they needed. Aside from simply eliminating many irrelevant terms, this group further trimmed the LWV by excluding complex words in favor of simpler synonyms. The limited vocabulary that resulted was easier to use, but ultimately unsuccessful. Because it had been devised by a group insulated from the actual composition of manuals, the writers who used the vocabulary regarded it as an imposition. It was an idea of which words they *should* use rather than those they *did* use, and resented accordingly.

In contrast, IBM Rochester's solution started with the manuals themselves and worked up to the LWV. The objective was not to change writers' habits unnecessarily, but to make a limited vocabulary a realistic tool for writing more readable manuals. As before, a task force was set up to analyze the problem. This time, however, the task force combined the data sets (the automated texts of manuals) from 47 existing manuals and three different systems. This much larger data set could be sorted either alphabetically (as in the following figure) or by frequency of use, giving the task force a measurement of which words were used, and how often, in our manuals.


Line Number in
Data Set where
Word Appears

A Sample of the Data Set Output, Sorted Alphabetically

Three Criteria

To make the data set more manageable, the task force pared away the obvious misspellings and typographical errors, numbers, and unique product terminology like procedure names. Each remaining word was assigned a grade level from the LWV, and was evaluated in terms of three criteria: (1) its necessity (does an easier word exist that means essentially the same thing?), (2) its frequency of use, and (3) its familiarity, by grade level. The LWV, employed previously as the only arbiter of importance, became instead a resource (albeit the most important one) for the task force's own evaluation.

The Word List, Master Glossary, and Substitution List

The first two criteria measured the importance of each word; the last criterion measured acceptability, based on the commitment to an eighth-grade level of difficulty. With these in mind, the task force sifted the data set and considered three alternatives for dealing with each word. The first, for words that were deemed both *important and acceptable*, placed the word along with its conjugate forms in a project-specific Word List. The Word List contained approximately 4400 words, all within the eighth-grade limit except for 26 that the task force itself judged to be acceptable. (For example, the LWV defined "fail" as "go out of order" and listed it as a tenth-grade word. The task force decided that the LWV's definition was confusing enough to skew the test, and included "fail" in the Word List. None of these 26 words was a computer term except for the obvious one: IBM.) Once formulated, the Word List was included as part of the project objectives.

If the task force thought the word *important but not acceptable*, it stipulated that the word had to be defined before it could be used in any manual. These were primarily technical terms, unfamiliar to the students tested for the LWV, but vital in any discussion of a computer system: algorithm, byte, default, queue, priority. Most of these terms were already defined in a master glossary, a document held over from previous systems that writers drew on for definitions to include in their individual manuals. In many cases, however, the old definitions were found to be unacceptable when evaluated with the Word List. Redefining such terms became a task separate from, but associated with, the maintenance of the Word List. The job was given to a terminology coordinator, who compiled a substitution list of phrases to replace the unacceptable words as he updated the master glossary.

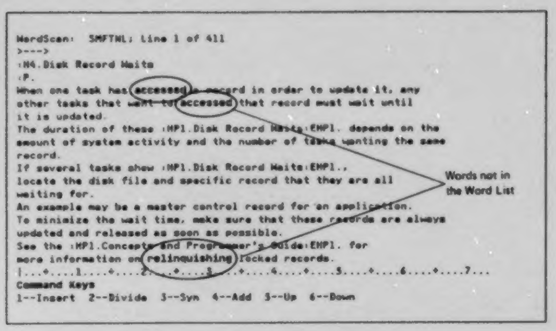
Writers had some latitude in deciding how to use the master glossary. If the word was important enough in a particular manual (such as the concept of *configuration* in a program installation manual), the writer could define it himself when it first appeared in the manual, and include the master glossary definition in the glossary for that manual. If the word was important in other manuals but not so much in this one, the best alternative relied on the glossary definition alone, so as not to interrupt the flow of text. A word important in a single, specialized manual exclusively would probably be defined only in text: a master glossary definition may not even exist for the word.

Because the effort had begun with 47 actual manuals, no real words could be excluded outright from the Word List as irrelevant. The task force did reject many words as neither *important nor acceptable*, however. Some words were easily discarded. "Nonnumeric" ("letters" seems the obvious alternative, but was ignored 207 times in our manuals), "subparameter," and "unupdated" were piles of prefixes that did not even merit a listing in the LWV. "Encrypt," although a word frequently used by programmers to describe the encoding of data, had the unwanted connotation of entombment. Other complex words were not as obviously bad, but had an adequate, eighth-grade level or below synonym in the substitution list. In these cases, the substitution could be made cleanly, such as "programming" for "software" or "main storage" for "memory." More often, a trade-off had to be made when using the substitution list. Shades of meaning *were* occasionally lost. Using "additional" as a synonym for "auxiliary" missed the idea of relationship implied in the latter term; preferring "purpose" to "function" added an unintended meaning to something that may be purposeless. Finally, some of the suggested substitutions were well-intentioned but clumsy. "Save space for" instead of "allocate" and "known though not said" for "implicit" replaced single, precise words with imprecise phrases.

To forestall any possible resentment that a limited vocabulary could generate among writers, the task force encouraged suggestions from those who had to use the three documents. The most radical comment was to do away with the eighth-grade limit altogether, and for certain specialized manuals–those clearly not intended and admittedly incomprehensible to the target audience–the requirement was lifted. The task force also accepted input to the master glossary, defining terms as necessary for developing products or reviewing a writer's definition for important but not acceptable terms. And, knowing that many proposed substitutions were imperfect, the task force invited writers to come up with more elegant ways of rephrasing them.

MAKING IT WORK

Writers soon grew as familiar with the Word List as with the technical content of their manuals. They learned which recurring terms were within the eighth-grade limit, which terms had to be defined and where best to do so, and which terms were better to write around. The Word List could be automated as well, because all manuals were entered as data sets on a text-processing system. A program, much like the one that had sorted the manuals originally, was written to compare a data set against the Word List and to identify on a printout those terms above the eighth-grade level. If a writer entered his own text–which, coincidentally, became the more popular alternative at the same time the Word List was implemented–he could immediately check it against the eighth-grade requirement with an interactive version of the same program. Pressing a special key at the display station caused words above the eighth-grade limit to be highlighted; pressing another key with the cursor underneath the highlighted word displayed a "window" of synonyms that could be used instead. If the word was already defined. the writer could add it to an addendum dictionary by pressing a third key, and the word would no longer be highlighted. Used properly, this interactive program allowed a writer to comply with the Word List while his text was still fluid.



```
WordScan:  SMFTNL: Line 1 of 411
>--->
:H4.Disk Record Waits
:P.
When one task has accessed a record in order to update it, any
other tasks that want to accessed that record must wait until
it is updated.
The duration of these :HP1.Disk Record Waits:EHP1. depends on the
amount of system activity and the number of tasks wanting the same
record.
If several tasks show :HP1.Disk Record Waits:EHP1.,
locate the disk file and specific record that they are all
waiting for.
An example may be a master control record for an application.
To minimize the wait time, make sure that these records are always
updated and released as soon as possible.
See the :HP1.Concepts and Programmer's Guide:EHP1. for
more information on relinquishing locked records.
|...+....1....+....2....+....3....+....4....+....5....+....6....+....7...
Command Keys
1--Insert  2--Divide  3--Syn  4--Add  5--Up  6--Down
```

A Sample Display from the Word List Program

The task force did not rely solely on individual compliance, however. By reviewing each other's manuals, writers were able to check ways of presenting terms common within their manuals. Also, the editing department, which had a vested interest in a limited vocabulary and much influence on the task force, made the use of the Word List a prerequisite for approval of a writer's draft. Although editors had no real authority to enforce this rule, management, which did, made it a job requirement.

The first computer system with manuals that use the Word List, the IBM System/36, was recently introduced. Results so far, though tentative, are consistently positive about the readability of the new manuals as compared with previous IBM Rochester publications. Most writers would reach the same conclusion. Restrictions that may have seemed unjustifiable to a writer absorbed in a particular manual became credible when applied with diligence across the library. IBM Rochester manuals are more readable, and Information Development writers are more aware of what makes them so.

REFERENCE

1. Dale, Edgar and O'Rourke, Joseph. *The Living Word Vocabulary*. Chicago: Dome Press, Inc., 1976, p. i.

ACKNOWLEDGMENTS

Sylvia Rolfs, a member of the Information Development task force on vocabulary that adapted the LWV, contributed much of the information for this paper. Al Groelle, another task force member and the original terminology coordinator, helped ensure its accuracy. Ken Oelfke, my manager, also reviewed the paper and offered valuable suggestions.

Creating Better Examples for Computer Manuals

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Examples are important in helping readers understand concepts in technical information. As the computer becomes available to more and smaller businesses, it becomes even more important that examples be meaningful, consistent, and easily understood. Because many writers are involved in writing information for a system, consistency of examples across the product library can become a real problem.

Rochester Information Development created a sample business that is used as a framework for developing examples. Writers use this common data base to code examples in all languages supported by the system. The sample business includes a description of the business environment, personnel in the business, and sample data regarding the business.

INTRODUCTION

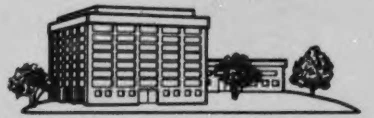
Suppose you were given a novel in which everything and everyone changed from chapter to chapter. That's what you expect, right--character and plot development. But suppose in this book "good old George" in Chapter 1, suddenly, and for no apparent reason, becomes "terrible Ted" in Chapter 2. And George's job as director of the water works suddenly dries up and we find Ted "high and dry" in a desert research laboratory. Confusing? Woody Allen might get away with this, but everyone else would have to have their socks darned by Tuesday. What has all this got to do with a sample business?

Quite a lot, actually.

Examples, such as sample programs and lines of code, are important in helping readers understand concepts in technical information. As the computer reaches more and smaller businesses, it becomes increasingly important that examples be meaningful, consistent, and easily understood. Because many writers might be involved in writing information for a project, consistency of examples across the system (creating a display, entering the source statements, using the same display in an interactive program) can become a problem. Just like in the novel, the readers expect consistency. But if you don't plan for it, that's not what they'll get.

One way to help solve this problem is to create a hypothetical business that is used as a framework for developing examples. Writers then create examples within this framework to support the concepts being presented.

WHAT IS A SAMPLE BUSINESS?



A sample business is a device used to provide consistency of examples within a manual and within all the manuals in a product library. A sample business contains:

- A description of the people, environment, and data processing needs of a hypothetical business.
- Sample data for the hypothetical business.

With this information you can write sample programs that the business would use in its daily operation.

The type of business chosen for the sample must be meaningful to the reader. If the business is specialized or uncommon, readers might not identify with the examples being used. For example, you don't want to use a plumbing business if all the readers are bankers.

Your readers probably work in a large spectrum of businesses. Therefore, your examples should show general applications that apply to most businesses, such as order entry, inventory control, and accounts receivable. A word of caution: be careful that you are not "giving away" an application that your company is also trying to sell. As the sample business is developed, it includes the sample data and sample programs that will run on the system that is being developed.

Who benefits from the sample business?

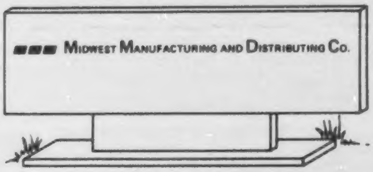
- **Writers** benefit by having a common data base and theme that they can use to develop examples for their books. In addition to making the examples more consistent and meaningful, the sample business helps the writer ensure accuracy of the examples by providing data for testing the examples on the system.
- **Readers** benefit because they know what to expect from manual to manual. The sample business need not be explained in detail to the readers. In fact, it is better if the business is not explained because some readers might think that that particular business (and therefore the examples) does not apply to them. The important idea is that the reader sees consistent and meaningful examples. This is now possible because all examples are based on activities related to a single business.

HOW DO YOU DEVELOP A SAMPLE BUSINESS?

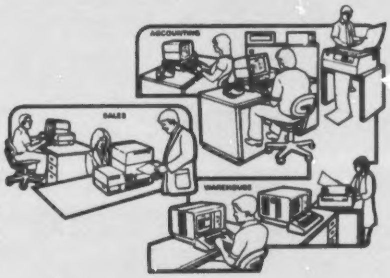
First things first! Know your audience. Then follow a few simple steps to create your own "business:"

1. **Learn about the background and experience of your readers.** (That's worth repeating.) Also, learn what types of examples the writers intend to use. Learning about these things will help you choose the hypothetical business.

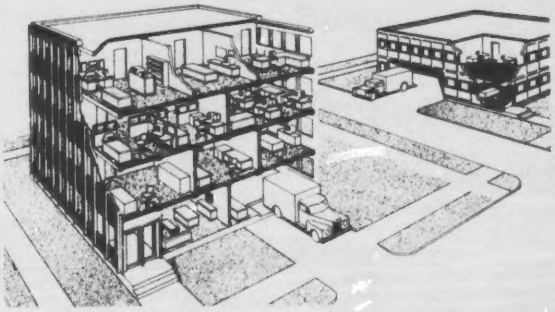
2. **Identify the type of hypothetical business.** Remember, you must choose a business to which your readers, including those in other countries, can relate.


Midwest Manufacturing and Distributing Co.

3. **Describe the people involved in the hypothetical business.** This description should include job titles and job responsibilities. This information can help writers if the examples contain individuals' names or responsibilities.

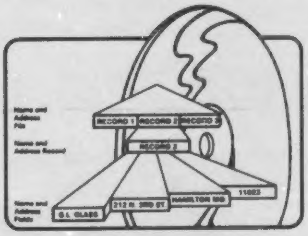


4. **Describe the environment.** This includes the buildings, office layout, and whether the location is a home office or branch office. This information can lead to consistent art and illustrations as well as examples.



5. **Describe the data processing needs.** This includes the reasons why the business needs a computer, the replaced manual procedures, and the type of information to be stored in the computer.

6. **Describe the format of the data stored in the computer.** Identify the name and length of the fields in the records. If there is more than one type of record (for example, master and transaction), describe each type. Then create files with sample data. This data can be used to test sample programs.



7. **Develop the general menus or prompts that will call the sample programs.**

8. **Define the sample programs that need to be written to support the sample business.**

Now let's put this whole "business" to work.

HOW DO YOU USE THE SAMPLE BUSINESS?

Now that you've created the sample business, you can use it to start developing examples for your product library. Almost. First you must decide who should write the sample programs—writers or programmers?

There are pros and cons for either group. You decide.

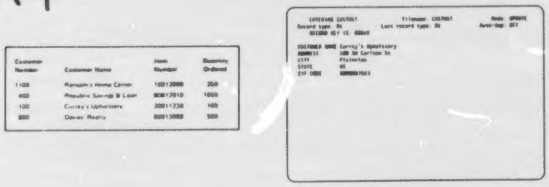
- Writers can create examples as required.
  - **Advantage**. The examples can be tailored to the information being presented in a given manual.
  - **Disadvantage**. Writers do not always have the necessary programming experience to create meaningful examples.

- An experienced programmer can write a complete application.
  - **Advantages**.
    - The examples are more consistent and representative of real life applications.
    - The programming code can be thoroughly tested. Even one line examples can be tested.
  - **Disadvantages**.
    - The programming effort is greater, especially if the application must be written in more than one programming language.
    - The examples might not fit the information.
    - Programmers may not be as sensitive to customer needs.

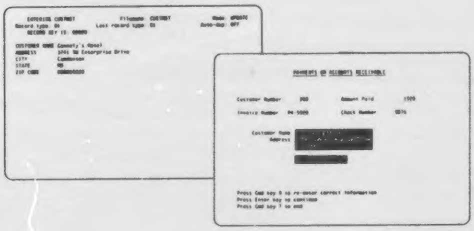
You'll probably find that negotiation and compromise are the best bet. Let the programmers write the application programs for the business. Let the writers define the applications and select the code to create the examples for the manuals.

To use the sample business simply means that all writers working on the project create their examples from a common data base (the sample programs and their associated data files). It follows that the customer will be more at ease if commonality exists within all the books in the library, as witness the following examples.

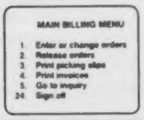
HAPPINESS IS...



... NOT HAVING THE CUSTOMER CHANGE FROM AARDVARK INC TO WIDGET Co ON EVERY PAGE OF EVERY BOOK.



HOW DO YOU MAINTAIN THE SAMPLE BUSINESS?



MAIN BILLING MENU

1 Enter or change orders
2. Release orders
3 Print picking slips
4. Print invoices
5. Go to inquiry
24 Sign off

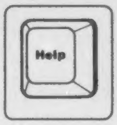
To ensure control of the sample business, take the following steps:

- Make sure that the sample programs are a part of the sample business; that is, each sample program can be called from a prompt or menu.

- Use sample data to test all sample programs.

- Update the sample business programs and descriptions as the capabilities of the system are expanded. Yesterday's examples do not describe today's function.

CONCLUSION



The creation of a sample business is not difficult, but it does take a lot of planning. However, you should have done a considerable amount of the "dog work" in learning about your audience. If you're willing to follow the steps outlined in this paper, you'll find that providing meaningful examples to your readers is a lot easier than you think. Don't give your customer, like the novel reader, the business. Give him the sample business.

Graphic Techniques for Technical Manuals

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Writers and editors! Don't let the word "graphic" scare you away from this session. We're not talking about whether or not you can draw.

We're talking about putting all your meaty copy into a readable form, using graphics you can easily put together yourself.

You will hear about developing readable and effective tables by studying bad examples, learning how to make them into good examples.

You will learn about a unique "message matrix" system you can make up yourself to substitute for tedious text.

And you will hear all about a new graphic technique developed to represent complex command syntax used in a computer language.

You've heard it many times--readers don't like to pour over tedious text to discover the important content. And aren't we writing for the convenience of our readers?

If you don't have the facilities or staff for fancy artwork, or want to supplement your artwork with some readable graphics, this session will be especially helpful.

The papers included in this session are as follows:

"How to Present Tabular Information Badly"
Gerald A. Mann

"Packaging Problem Prose"
Donald F. Ford, Ph.D.

"System/38 Syntax Diagrams: A Better Idea"
Harold E. Anderson

How to Present Tabular Information Badly

Gerald A. Mann

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Tabular presentation is one area of technical communication that receives little attention and, consequently, is poorly understood. As a result, methods of displaying information badly in tabular form have been discovered, developed, and used by thousands of people over the years, so that now there is a wide variety of ingenious schemes available to the writer or editor who wishes to challenge his readers. While technical literature abounds with examples of deceptive and incomprehensible tables, most of the more prominent kinds of errors can be categorized by the structural table element in which they appear. Thus, examples are presented of confusing titles, irregular stubs, scrambled boxheads, and frustrating footnotes, as well as conglomerate constructions. So that the uninitiated may appreciate the brilliance of these nefarious techniques, they are paired with the seldom-used alternatives which may reveal the actual message of the data.

INTRODUCTION

In statistical publications, tables and their accompanying text tend to be the only results of the expenditures of effort, time, and money which the using public sees; hence the user's evaluation of all operations tends to be based on the final step, that is, on the statistics as presented. Good presentation transmits the quality of the previous operations and, in turn, assists in making clear the meaning of the material. Poor presentation not only fails to clarify the data, it tends to impair or destroy the effect of the work that has gone before. In this respect, some authors are their own worst enemies.

In the design and preparation of statistical tables,the basic objective is to arrange and present data in such a way that their meaning and significance can readily be grasped by the user. The principles for accomplishing this objective are much the same for tables as for text. The writer of both text and tables should ask him/herself the question: "Which method is simple, focuses the reader's attention on the data (rather than on the form), and makes clear the meaning and significance of the information?" Whatever clarifies the meaning of the statistics and concentrates the reader's attention upon them is good presentation; whatever obscures the meaning of the data or distracts attention from them is poor presentation.

Proper attention to mechanical style and form is essential, but forcing statistics into a rigid physical pattern, or an overreliance upon mechanical tricks, can easily defeat the whole purpose of tabular presentation. Mechanics should be completely bound by content, since a perfect physical pattern fitting the available space is useless if meaning is impaired or destroyed.

One way to look at these principles in action is to consider the many ways authors have of violating them: they write lengthy, ambiguous, or confusing titles; organize stubs and boxheads irregularly; write footnotes in essay form; and conserve their energy by jamming several tables together in one rickety overall structure. The following sections address each of these foul strategies. (Many of the examples of poor tabular presentation were noticed and repaired in the manuscript stage, but—alas!—some slipped past their usually alert editors into printed publications.)

WRITE CONFUSING TITLES

The table title serves two purposes: (1) it furnishes a brief description of the data presented, and (2) it highlights the difference between the table it identifies and all other tables in the same report. It need not refer to all classifications shown in the table; its purpose is to guide the reader within the publication. A title that is long and detailed may be more confusing than it is enlightening. Several titles that are nearly alike will make it difficult to find a particular table of interest.

Both wordy titles and overly similar titles have something in common: they obscure the most useful and informative part of the table titles. One way to examine this problem is to look at a list of all the table titles in a report. Exhibit A shows part of a table of contents in which every table title begins with the same twelve words (most of which duplicate the report title). Notice how difficult it is to find the table for North Carolina. The writer of these table titles can take pride in the assurance that his readers will quickly become frustrated and disgusted with this strategy. (In exhibit B some foolish editor, who was thinking only of the reader's needs and not of the author's, has deleted the repetitious leading portions of the table titles so that now any fool can easily find the table in which he or she is interested.)

4. 1977 per capita money income estimates
   for counties and incorporated places
   in Florida.................................. 00
5. 1977 per capita money income estimates
   for counties and incorporated places
   in Georgia.................................. 00
6. 1977 per capita money income estimates
   for counties and incorporated places
   in Maryland................................. 00
7. 1977 per capita money income estimates
   for counties and incorporated places
   in North Carolina........................... 00
8. 1977 per capita money income estimates
   for counties and incorporated places
   in South Carolina........................... 00

EXHIBIT A

4. Florida..................................... 00
5. Georgia..................................... 00
6. Maryland.................................... 00
7. North Carolina.............................. 00
8. South Carolina.............................. 00

EXHIBIT B

Many authors feel that no part of the contents of the table should be omitted from the title, lest they feel neglected. However, clarity and ease of use are better served if information available to the reader from other sources (the report title, the chapter or section title, the boxhead, etc.) is omitted from the table titles. In general, a table title more than 1½ lines long contains too much information for the reader to assimilate. Exhibit C shows examples of lengthy table titles that would put an insomniac to sleep halfway through them. If you examine these titles very closely, you will note that only the year is different; wasn't it clever of the author to bury it in the middle of 33 words? An editor who cared about the reader's needs might have reworded these titles as shown in exhibit D.

Table 23. EXPECTED LIFETIME INCOME FOR MALE YEAR-ROUND FULL-TIME WORKERS 18 TO 64 YEARS OLD WITH INCOME IN 1972, BY YEARS OF SCHOOL COMPLETED, AGE, SELECTED DISCOUNT RATES, AND SELECTED ANNUAL PRODUCTIVITY INCREASE

Table 24. EXPECTED LIFETIME INCOME FOR MALE YEAR-ROUND FULL-TIME WORKERS 18 TO 64 YEARS OLD WITH INCOME IN 1971, BY YEARS OF SCHOOL COMPLETED, AGE, SELECTED DISCOUNT RATES, AND SELECTED ANNUAL PRODUCTIVITY INCREASE

EXHIBIT C

Table 23. MALE WORKERS WITH INCOME IN 1972--EXPECTED LIFETIME INCOME FOR YEAR-ROUND, FULL-TIME WORKERS

Table 24. MALE WORKERS WITH INCOME IN 1971--EXPECTED LIFETIME INCOME FOR YEAR-ROUND, FULL-TIME WORKERS

EXHIBIT D

USE IRREGULAR INDENTATION IN THE STUB

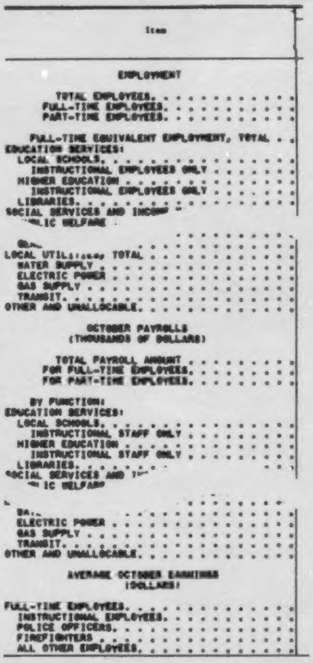
The stub is the portion of a table, usually the first column on the left, in which are located the data line captions and needed classifying and qualifying headings.

Indentation is used in the stub to indicate organization and subordination; that is, which items are of equal importance, and which are component parts of other items. Centerheads and sideheads divide the detailed stub items into groups and subgroups in the same manner as various kinds of section and paragraph headings divide text into coherent units. The stubhead (the caption at the top of the stub, located in the boxhead area) provides a general title, similar to a chapter title, for the contents of the stub. Both the indentation scheme and the heads work together to provide a kind of outline of the information shown in the table. Such an important part of the table structure, with its often unavoidable complexities, offers many opportunities for misleading and confusing the user.

Exhibit E presents a stub with several problems, some of which can be easily corrected and others of which require consultation to find out what the author had in mind. First, the stubhead "Item" is so general and universal it could be used in nearly any table; something that more specifically describes the contents of the stub would be more useful to the reader.

Also notice that the stub in exhibit E is divided into three major groups by the centerheads: Employment, October Payrolls, and Average October Earnings. (A reverse indentation scheme has been used, in which total captions are indented most.) Under Employment, the caption "Full-Time Equivalent Employment, Total" logically should be closed up to and indented the same as "Part-Time Employees"; however, the caption is also used to indicate that all the following items are full-time equivalent, in which case it should stay where it is. This in itself may be clear to the reader, but then the question arises: "Are the items under 'October Payrolls' also for full-time equivalent, or for full-time, or what?" This must be clarified by the author.

Finally, under "October Payrolls" there is a colon line "By Function." Why is this here, but not under the other two major headings? Does it apply only to the three services immediately following, or also to "Local Utilities," etc., which follow after a space? How does it help the reader? By raising these questions in the reader's mind, this simple two-word line helps stimulate confusion and frustration.



Item
EMPLOYMENT
TOTAL EMPLOYEES. . . . .
FULL-TIME EMPLOYEES. . . . .
PART-TIME EMPLOYEES. . . . .
FULL-TIME EQUIVALENT EMPLOYMENT, TOTAL . .
EDUCATION SERVICES:
LOCAL SCHOOLS. . . . .
INSTRUCTIONAL EMPLOYEES ONLY . . . . . .
HIGHER EDUCATION . . . .
INSTRUCTIONAL EMPLOYEES ONLY . . . . . .
LIBRARIES. . . . .
SOCIAL SERVICES AND INCOM
LIC WELFARE .
. . . .
. . . .
LOCAL UTIL TOTAL . . . .
WATER SUPPLY . . . .
ELECTRIC POWER . . . .
GAS SUPPLY . . . .
TRANSIT. . . . .
OTHER AND UNALLOCABLE. . . . .
OCTOBER PAYROLLS (THOUSANDS OF DOLLARS)
TOTAL PAYROLL AMOUNT . . . .
FOR FULL-TIME EMPLOYEES. . . . .
FOR PART-TIME EMPLOYEES. . . . .
BY FUNCTION:
EDUCATION SERVICES:
LOCAL SCHOOLS. . . . .
INSTRUCTIONAL STAFF ONLY . . . .
HIGHER EDUCATION . . . .
INSTRUCTIONAL STAFF ONLY . . . .
LIBRARIES. . . . .
SOCIAL SERVICES AND
IC WELFARE
. . . .
. . . .
ELECTRIC POWER . . . .
GAS SUPPLY . . . .
TRANSIT. . . . .
OTHER AND UNALLOCABLE. . . . .
AVERAGE OCTOBER EARNINGS (DOLLARS)
FULL-TIME EMPLOYEES. . . . .
INSTRUCTIONAL EMPLOYEES. . . . .
POLICE OFFICERS. . . . .
FIREFIGHTERS . . . .
ALL OTHER EMPLOYEES. . . . .

EXHIBIT E

SCRAMBLE THE BOXHEAD

The boxhead has a similar function to that of the stub, in that it contains captions and headings that segregate and describe the data; however, the boxhead runs across the top of the table and identifies vertical data columns rather than horizontal data rows. Spanner heads perform the same function in the boxhead as centerheads and sideheads perform in the stub: they classify the detailed captions into groups and subgroups. Here again, there is ample opportunity to bewilder the data user.

In exhibit F, the spanner heads "Completions" and "Under construction" properly group the column captions into two major categories; without these spanners, each column caption would have to include the term from the spanner, which would be repetitious as well as making it harder to recognize that the detailed data fall into two general categories. However the single spanner head (or "banner head") is incorrect: it does not indicate categories of data, but instead applies to the entire table. As a rule, anything that describes the entire table should be in either the table title or the headnote. (Note that the headnote "In percents" applies to the entire table.)

As an outstanding example of a scrambled boxhead, exhibit G is a table guaranteed to discourage the most ardent seeker of data. Try to figure out the full title of any data caption (including categorizing information in the spanners)! Had the author of this table really intended to communicate with his readers, he would have broken this into several tables, each distinguished by a title that incorporated some of the spanner information.

(A similar fault sometimes shows up in a stub, in which there are too many levels of centerheads, sideheads, and colon lines. The remedy is the same: break the table into two or more separate tables.)

Table 8. SEASONAL INDEXES USED TO ADJUST HOUSING DATA

(In percents)

Period	Privately owned housing							
	Completions				Under construction			
	Implied U.S. total[1]	Structures with 1 unit	Structures with 2 to 4 units	Structures with 5 or more units	Implied U.S. total[1]	Structures with 1 unit	Structures with 2 to 4 units	Structures with 5 or more units

EXHIBIT F

Reinterview characteristics	Original characteristics—civilian population 14 years old and over																			
	Total	In civilian labor force														Not in civilian labor force				
		Total	Employed												Unemployed	Total	Keeping house	Attending school	Other, except unable to work	Unable to work
			Total	In agricultural industries	In nonagricultural industries															
					Total	Full time	Part time							With a job not at work						
							Total	Economic reasons			Noneconomic reasons									
								Total	Usual full time	Usual part time	Total	Usual full time	Usual part time							

EXHIBIT G

WRITE FRUSTRATING FOOTNOTES

At their best, whether in text or tables, footnotes are a distraction to the reader. At their worst, they can try the reader's patience to the breaking point. One effective way to displease the reader is to take up twice as much space with a footnote as it needs by repeating information the reader already knows (a technique already discussed in connection with titles). This method has the added advantage of making footnotes so forbiddingly lengthy that only the most assiduous seeker of truth and qualifying statements will have the nerve to plunge into them.

Exhibit H presents an example of a footnote made overly long by repeating the column caption and the data line caption that identify the footnoted data. Exhibit I shows the shorter version, so dangerously abbreviated that almost any reader may be willing to read it.

---- ----	--------------------- ---------------------	Establishments without payroll	----- -----
6552	Subdividers and developers, n.e.c...	[3]1,234	

---

[3] Data for establishments without payroll in industry group 6552, subdividers and developers, n.e.c., may include data for cemetery subdividers.

EXHIBIT H

---

[3] May include data for cemetery subdividers.

EXHIBIT I

Another type of footnote frustration results when the reader is sent to a different part of the report for information, and the information found there is shorter than the footnote by which he was sent. A nice example of this tactic is shown in exhibits J and K.

See footnotes at end of table.

EXHIBIT J

---

[3] Data not available.

EXHIBIT K

USE CONGLOMERATE CONSTRUCTIONS

Conglomerate table constructions often are not so much misleading or confusing as they are offensive to the reader's quest for neatness and order. They result when an author has numerous things to say (in tabular form) about a subject and doesn't invest the effort to draw up several separate tables in which to say them. A small advantage of using separate tables, in addition to reducing page clutter, is that the title of each will show up in the list of tables at the front of the report.

Exhibit L is a marvelous example of a conglomerate table, which—besides offending the eye—contains several points of confusion. For one, notice that in the field spanner heads over the second and third parts of this table, the distinction between "inventory" and "sales" is not easy to spot. For another, the reader's expectation that a single section of "poultry inventory" would be followed by a single section of "poultry sales" is defeated, and his/her sense of symmetry is offended; why aren't the kinds of birds being sold the same as the kinds counted as inventory? The many other problems in this table are left for the reader to discover.

CONCLUSIONS

While the title and tone of this presentation tended to be light and pointed in the wrong direction, the purpose is serious and constructive. Many otherwise competent technical and scientific writers find it difficult to design and assemble clear and effective tables. But in fact, the principles of good tabular presentation are similar to those of good text presentation: tell the reader only what he or she needs to know, try for clear and effective organization, and anticipate the reader's questions and confusion. Don't be afraid to convert number-heavy text into tables, but don't expect tables to come together easily. As tables are highly condensed areas of information, they require much more care and attention than text. Make sure the title clearly and accurately describes what the numbers in the table represent, but keep it short. Critically review each table individually, and then do the same for all tables as a whole. Above all, don't try to put too much information in one table.

Table 19. Poultry—Inventory and Sales: 1978 and 1974

		Inventory				Sales			
		All farms		Farms with sales of $2,500 or more		All farms		Farms with sales of $2,500 or more	
		Farms	Number	Farms	Number	Farms	Number	Farms	Number
Any poultry	1978	198	(X)	116	(X)	98	(X)	64	(X)
	1974	109	(X)	84	(X)	71	(X)	62	(X)
Chickens 3 months old or older	1978	141	1 240 881	83	1 241 603	42	662 710	38	660 433
	1974	95	1 385 440	75	1 383 961	51	918 715	46	910 363
Farms with—									
1 to 1,599	1978	112	3 686	56	1 638	19	4 600	14	4 340
1,600 to 3,199	1978	3	7 000	3	7 000	3	7 656	3	7 656
3,200 to 9,999	1978	3	34 100	3	34 100	9	39 785	9	39 785
10,000 or more	1978	23	1 289 045	23	1 289 045	12	591 252	12	591 252
Hens and pullets of laying age	1978	137	1 065 386	80	1 063 892	42	330 548	37	330 309
	1974	93	1 046 635	71	1 045 357	46	434 535	43	434 184
Farms with—									
1 to 99	1978	108	1 937	48	993	13	301	9	178
100 to 399	1978	7	(D)	4	480	2	(D)	1	(D)
400 to 1,599	1978	-	-	-	-	5	4 000	3	4 000
1,600 to 3,199	1978	3	5 730	3	5 730	3	7 000	3	7 000
3,200 to 9,999	1978	3	19 000	3	19 000	9	39 300	9	39 300
10,000 to 19,999	1978	4	57 000	4	57 000	4	48 000	4	48 000
20,000 to 49,999	1978	13	416 099	13	416 099	4	96 483	4	96 483
50,000 to 99,999	1978	3	285 666	3	285 666	2	(D)	2	(D)
100,000 or more	1978	2	(D)	2	(D)	-	-	-	-
Broilers and other meat-type chickens	1978	40	421 230	27	426 784	27	2 380 757	18	2 386 597
	1974	20	374 386	16	374 049	20	1 930 031	16	1 929 899
Turkeys	1978	12	79	6	25	2	(D)	-	-
	1974	(NA)	(NA)	4	104	(NA)	(NA)	1	(D)
For slaughter	1978	9	54	4	31	2	(D)	-	-
	1974	(NA)	(NA)	4	83	(NA)	(NA)	1	(D)
Hens kept for breeding	1978	4	25	2	(D)	-	-	-	-
	1974	(NA)	(NA)	2	(D)	(NA)	(NA)	-	-
Ducks, geese, and other poultry	1978	79	(X)	40	(X)	35	(X)	11	(X)
	1974	(NA)	(X)	18	(X)	(NA)	(X)	7	(X)

	Selected poultry inventory, 1978 – All farms									
	Chickens 3 months old or older						Pullet chicks and pullets under 3 months old		Broilers and other meat-type chickens	
	Total		Hens and pullets of laying age		Pullets 3 months old or older not of laying age					
	Farms	Number	Farms	Number	Farms	Number	Farms	Number	Farms	Number
Farms with chickens 3 months old or older, inventory	141	1 240 881	137	1 065 386	42	178 215	28	133 834	22	47 862
1 to 99	105	2 231	108	1 937	34	344	15	182	16	427
100 to 399	6	935	6	(D)	2	(D)	2	(D)	1	(D)
400 to 1,599	1	(D)	1	(D)	1	(D)	1	(D)	1	(D)
1,600 to 3,199	3	7 000	3	5 730	2	(D)	1	(D)	-	-
3,200 to 9,999	3	24 100	3	19 000	3	5 100	2	(D)	1	(D)
10,000 to 19,999	4	59 000	4	57 000	1	(D)	1	(D)	1	(D)
20,000 to 49,999	12	487 289	12	386 099	5	21 410	4	20 463	1	(D)
50,000 to 99,999	5	342 770	4	225 666	3	107 104	2	(D)	1	(D)
100,000 or more	2	(D)	2	(D)	1	(D)	-	-	-	-
None	(X)	(X)	(X)	(X)	(X)	(X)	-	-	23	283 368

	Selected poultry sales, 1978 – All farms									
	Chickens 3 months old or older						Broilers and other meat-type chickens		Value of poultry and poultry products	
	Total		Hens and pullets of laying age		Pullets 3 months old or older not of laying age					
	Farms	Number	Farms	Number	Farms	Number	Farms	Number	Farms	Value ($1,000)
Farms with chickens 3 months old or older, inventory	(NA)	661 700	41	(D)	6	(D)	9	209 832	67	13 997
1 to 99	(NA)	163	10	140	2	(D)	4	234	33	9
100 to 399	(NA)	275	2	(D)	1	(D)	-	-	4	28
400 to 1,599	(NA)	(D)	1	(D)	-	-	1	(D)	1	(D)
1,600 to 3,199	(NA)	1 000	3	1 000	-	-	-	-	3	65
3,200 to 9,999	(NA)	6 380	3	6 380	-	-	1	(D)	3	310
10,000 to 19,999	(NA)	43 400	4	43 400	-	-	1	(D)	4	744
20,000 to 49,999	(NA)	117 375	12	(D)	1	(D)	1	(D)	12	4 819
50,000 to 99,999	(NA)	379 384	4	33 395	2	(D)	1	(D)	5	3 730
100,000 or more	(NA)	(D)	2	(D)	-	-	-	-	2	(D)
None	(NA)	(D)	1	(D)	-	-	18	2 378 965	38	3 191

	Selected poultry sales, 1978 – All farms – Con.									
	Chickens 3 months old or older		Hens and pullets of laying age		Pullets 3 months old or older not of laying age		Broilers and other meat-type chickens		Pullet chicks and pullets under 3 months old	
	Farms	Number	Farms	Number	Farms	Number	Farms	Number	Farms	Number
Specified poultry sold	42	662 710	42	(D)	6	(D)	27	2 380 757	2	(D)
1 to 1,999	19	4 600	20	5 301	3	39	15	2 364	1	(D)
2,000 to 3,999	4	10 686	4	10 686	-	-	-	-	-	-
4,000 to 7,999	4	23 473	4	23 073	1	(D)	-	-	-	-
8,000 to 15,999	8	81 399	8	81 399	-	-	-	-	-	-
16,000 to 29,999	3	66 482	3	66 482	-	-	2	(D)	-	-
30,000 to 59,999	2	(D)	2	(D)	-	-	2	(D)	1	(D)
60,000 to 99,999	1	(D)	1	(D)	-	-	1	(D)	-	-
100,000 or more	2	(D)	-	-	2	(D)	9	2 376 940	-	-

	Selected poultry sales, 1978 – All farms – Con.					
	Turkeys		Turkeys for slaughter		Turkey hens kept for breeding	
	Farms	Number	Farms	Number	Farms	Number
Specified poultry sold	2	(D)	2	(D)	-	-
1 to 1,999	2	(D)	2	(D)	-	-
2,000 to 3,999	-	-	-	-	-	-
4,000 to 7,999	-	-	-	-	-	-
8,000 to 15,999	-	-	-	-	-	-
16,000 to 29,999	-	-	-	-	-	-
30,000 to 59,999	-	-	-	-	-	-
60,000 to 99,999	-	-	-	-	-	-
100,000 or more	-	-	-	-	-	-

EXHIBIT L

Packaging Problem Prose

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Readers generally do not enjoy penetrating formidable text to discover key content. Illustrations typically organize, condense, and often substitute for data plus portions of intricate text. This article demonstrates how the Message Matrix, a dynamic illustration technique, can assist anyone whose responsibilities include communication of complex policies, concepts, and procedures. The matrix, a receiver-oriented graphic format, is ideal for content analysis, will enchance oral presentations, can serve as a writing outline, and will completely substitute for portions of difficult text.

"One picture is worth more than ten thousand words."
. . . A Chinese Proverb

Aren't you tired of wading through tedious and complicated text? Why don't we see more illustrations used to deliver complex outgoing communications? Can graphics analyze and display involved incoming messages? Good questions. This article provides some answers plus a dynamic pictorial technical writing alternative.

Anyone who has labored either to write a complex procedure or understand one already in print, will identify with the opening proverb. Initially it appears clear enough that a change in format plus a reduction in volume should improve the communication process.

To supplement words, most of us already use tables, charts, graphs, diagrams, etc. to communicate intricate ideas. There is another format—the matrix—which provides excellent analysis and display capabilities. A specific variation which I've entitled the Message Matrix is especially valuable and effective with complex and difficult concepts.

THE MESSAGE MATRIX

Think of the Message Matrix as a gifted graphic which can "package problem prose". It will visualize involved options, conditions, decisions, categories, instructions, procedures, directives, etc. and display them in a logic-based relationship framework. The Message Matrix— What it is . . . How it works . . . When it is used . . . Why it is important—are demonstrated in this article.

Before proceeding, make a mental note (written if you prefer) of some communication difficulty you've experienced in the recent past. Your selection may either be incoming (as reader or user) or outgoing (as writer or speaker). Then, as you read this article, try to discover how a Message Matrix might be applied to your problem area.

THE MESSAGE MATRIX—What It Is

Let us begin by examining two concepts fundamental to the understanding of any matrix. First is the idea of a grid or network. Figure 1 shows a portion of the Oregon map. An extract from the map index, shown just above, lists Eugene as 5-C. To locate the city on the map, the reader proceeds vertically down the left margin to reach the number 5, then to the right horizontally to find Eugene under the letter C. Using this number-letter grid along the map margins, any city can easily be located.

INDEX TO CITIES AND TOWNS
Eugene, 104,000. . . . . .5-C

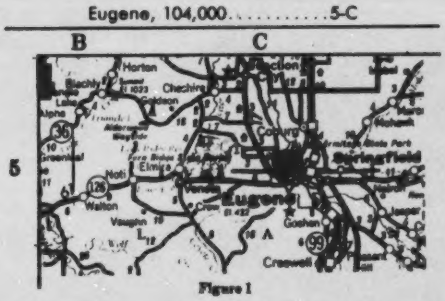

B
C
5
Horton
Cheshire
Noti
Elmira
Walton
Vaughn
Eugene
Springfield
Coburg
Goshen
Creswell
A

Figure 1

Figure 2 illustrates the second basic concept. You are observing the lower left portion of a Spanish language verb wheel. The irregular verbs of the language are located around the perimeter of a movable center wheel. In the position shown, the pointer addresses the verb *andar* (to walk) for which proper conjugation endings are automatically displayed in boxes under tense titles (i.e. Present Indicative, Present Subjunctive, etc.). *If* the pointer is moved to another verb, *then* the proper conjugation endings for the new verb are shown in the same boxes. This device mechanically displays a deductive logic relationship (*if . . . then*). It is virtually impossible for the user to obtain an incorrect answer.

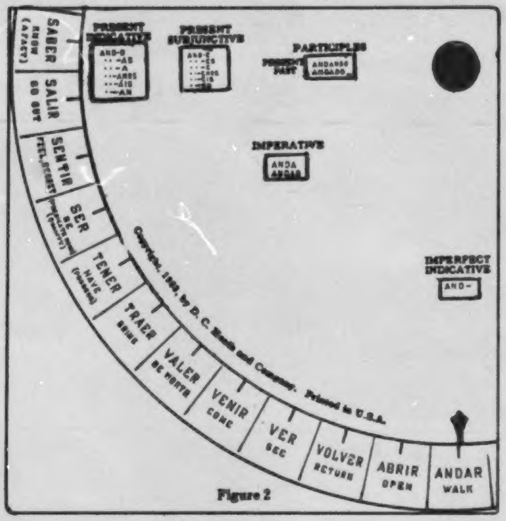

SABER
KNOW (A FACT)
SALIR
GO OUT
SENTIR
SER
BE
TENER
HAVE (POSSESS)
TRAER
BRING
VALER
BE WORTH
VENIR
COME
VER
SEE
VOLVER
RETURN
ABRIR
OPEN
ANDAR
WALK
PRESENT INDICATIVE
AND-O
-AS
-A
-AMOS
-ÁIS
-AN
PRESENT SUBJUNCTIVE
AND-E
-ES
-E
PARTICIPLES
PRESENT
PAST
ANDANDO
ANDADO
IMPERATIVE
ANDA
ANDAD
IMPERFECT INDICATIVE
AND-
Copyright, 1962, by D. C. Heath and Company. Printed in U.S.A.

Figure 2

Keep in mind both of these fundamental concepts as we look at the Message Matrix in action.

THE MESSAGE MATRIX—How It Works

The matrix shown in Figure 3 contains a few basic decision elements. There are only three rules, each on its separate numbered line. Every rule contains two conditions (If . . . And) plus one action (Then). The heavy vertical line separates these logic segments. The heavy horizontal line divides the headings from the matrix body. Please begin to read the instructions located just above the matrix, glancing down as the Rule 2 sentence develops.

This matrix reads from left to right. Each numbered line when combined with column headings, becomes a complete and independent sentence. For example, Rule 2 reads: "IF the weather condition is sunshine AND the outside temperature is 80°F and over THEN scheduled activity will be outdoor swimming." (Headings are in boldface)

DECIDING SATURDAY RECREATION

RULE	A **IF the weather condition is**	B **AND the outside temperature is**	C **THEN scheduled activity will be**
1	raining	variable	indoor basketball.
2	sunshine	80° F and over	outdoor swimming.
3	overcast	50° F and over	golf.

Figure 3

Rule 2 which begins with the word *IF* and ends with the word *swimming*. (followed by a period) is called a logic sentence. Combining the column headings with any other rule line, will produce a different complete and independent logic sentence. We should begin to see, at this point, how the Message Matrix can substitute completely for portions of complicated text.

Matrix column headings remain constant for all rule lines, because they contain the repetitive portions of the logic content. One of the difficulties often encountered when writing instructions, procedures, decision options, etc. is how to deal with and vary such redundancies. In a Message Matrix the redundant elements become part of the design framework, leaving only the content entries to vary.

Horizontal matrices are always read in the same manner. *When* a reader combines the column headings *And* the entries on a single horizontal line, *Then* the logic sentence obtained will be clear, concise, and complete.

The basic design of the Message Matrix contains a standard and familiar reading pattern which encourages reader confidence.

THE MESSAGE MATRIX—When It Is Used

As we review some additional examples, note that the design configuration follows the logic contained in the original communication.

Figure 4

TELEPHONE PROCEDURE

LINE	A **WHEN the call category is**	B **THEN TKOM employees will**	C **IN order to**
1	from one TKOM office to another	cross-check with others for additional contacts	use phone time judiciously.
2	often called offices (other TKOM, ASD, etc.)	consolidate several topics into the one conversation	avoid several separate calls.
3	work-related & from an "in-the-field" site	use TKOM *credit card* billing number	reduce expensive collect calls.
4	clients not living in local rate area	have clients call collect, station to station	utilize lowest possible rate.
INCOMING COLLECT CLIENT CALLS			
5	assigned counselor is available	accept call continuing conversation (no call back)	minimize cost while maximizing client service.
6	assigned counselor is not available	take message for action by assigned counselor	

Designed to illustrate a portion of the Office Instructions for a multi-branch consulting firm, the Message Matrix in Figure 4 completely replaces the original instructional segment shown below in Figure 5. Since the matrix stands in lieu of the written instructions, it can be removed from the Office Instruction book and placed near the phone for user convenience. The original mandate behind this development was "My employees are not following the Office Instructions, and the phone bill is too high".

I believe there is little question as to which is easier to read and use—the original Office Instruction format or the Message Matrix.

TELEPHONES

TKOM employees are encouraged to make judicious use of telephone time. Please make an effort, when calling from TKOM office to another TKOM office, to see if any other employees need to talk to anyone else at the office you are calling. Please attempt to limit the number of calls that are made to often-called locations (e.g., other TKOM offices and ASD offices) by consolidating the topics you wish to discuss into one conversation if possible, rather than making a separate telephone call for each topic.

When assigned to work with a client who does not live within "local" telephone rate distance, counselors should direct the client to call Station-to-Station collect when attempting to reach his/her counselor; i.e., rather than asking the the counselor specifically by name, the client should have the operator dial the TKOM office number and ask if "anyone" will accept the collect call. If the person for whom the client has called is unavailable, a message will be taken from the client, after accepting the telephone call. If the counselor is available, s/he should accept the telephone call and continue the conversation with the client, rather than hanging up and calling the client back.

Credit Cards - Employees should use the telephone credit card number, assigned to TKOM Consultants, when it is necessary to call the office or to make other work-related telephone calls, while "in the field." Each of TKOM Consultants' offices has a separate credit card number assigned to it; employees should use the number assigned to their office. Collect telephone calls (which are more expensive than credit card calls within Oregon) should be avoided by employees. Credit card numbers are for the use of TKOM employees for work-related telephone calls only.

Figure 5

Figure 6 contains a portion of the formal text on a senstive subject, which has legal implications, and is generally difficult to read and retain. Misinterpretation due to infrequent use, content complexity, or rapid consultation could result in improper initial decisions for employees at a stressful time.

8.3. PERSONAL LEAVE: Employees may take two days of personal leave per year with pay.

8.3.1. This leave is non-accumulative.

8.3.2. This leave must be scheduled with the employee's supervisor 24 hours in advance unless the incident giving rise to the need for the leave is of such emergency nature that advanced scheduling is not practicable.

8.3.3. This leave may not be used for the purpose of extending a holiday or vacation, except in the case of emergency.

8.3.4. Employees returning to work following a holiday or vacation period who have had their travel curtailed due to a strike, cancellation, or hazardous weather conditions will also merit the use of personal leave.

8.3.5. The request or explanation will contain a statement that the leave was not used or will not be used, as the case may be, for recreational, avocational or social purposes.

8.4. EMERGENCY LEAVE: Two types of emergency leaves, neither of which shall be charged to sick leave, are available with full pay, unless otherwise stated, as outlined below. Whenever possible, emergency leave shall be requested in advance.

8.4.1. DEFINITION OF TERMS: "Critical illness" shall include only serious illness or severe injury from which recovery is uncertain. Hospitalization does not necessarily imply "critical illness." "Immediate family" shall include the employee's mother, father, brother, sister, son, daughter, spouse, grandparent, grandchild, father-in-law, mother-in-law, stepfather, stepmother or anyone who has been or now is a member of the immediate household.

Figure 6

A Message Matrix in which all of the Bargaining Agreement provisions are completely replicated, is displayed as Figure 9. No one who has used this matrix prefers the original text format.

We see footnotes for the first time in Figure 7. Notes transmit information critical for specific understanding, and are read only when and where cited. Note 3, for example, adds essential information which pertains only to Rule 1. Note 3 will never apply to or be read in conjunction with Rules, 2, 3, and 4.

EMERGENCY AND PERSONAL LEAVE

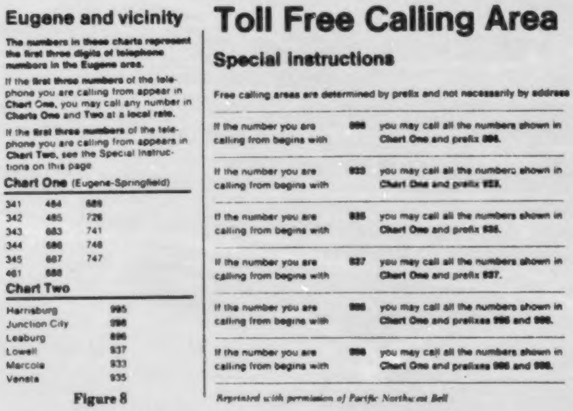
Figure 7

RULE	A	B	C	D	E	F
	WHEN the leave category is	AND the request is submitted	AND the absence is	THEN authorized fiscal year days are:		
				with full pay	with part deduction equal to $35 or half the daily salary	
					ordinary allowance	extenuating circumstances
1	**Emergency:** critical illness, immediate family (notes 1, 2)	for building administrator and Personnel Director approval	requested in advance wherever possible	2	3	additional days by Personnel Director decision (note 3)
2	**Emergency:** breavement, immediate family			5	5	
3	**Personal:** (non-accumulative)	to employee's supervisor 24 hrs. in advance (note 4)	non-emergency & will not extend holiday/vacation	2	The Agreement does not cover these areas.	
4			from stoppage in after holiday return travel (strike, cancellation, weather)			

NOTES:

1. Emergency leave is not charged to sick leave, and will whenever possible be requested in advance. Hospitalization does not necessarily imply "critical illness" which includes only serious illness/severe injury from which recovery is uncertain. "Immediate family" includes employee's mother, father, brother, sister, son, daughter, spouse, grandparent, father/mother-in-law, step-father/mother, or anyone who has been or now is a member of the immediate household.
2. Requests will include a full explanation of nature and extent of the illness plus name of attending physician or (if required by District) a certificate from the requestor for an ill person not using a physician due to philosophical belief, religious tenent, or church teaching.
3. No exceptions made extending the number of days for which full pay is allowed.
4. unless emergency generating incident makes advance scheduling impracticable.

So far we have examined matrix applications from the sender's point of view. Receivers can also use this technique to penetrate, analyze, and graphically display complicated messages. For example, using Figure 8, please try to quickly determine what other prefixes can be reached toll free from #998.



Eugene and vicinity

The numbers in these charts represent the first three digits of telephone numbers in the Eugene area.

If the **first three numbers** of the telephone you are calling from appear in **Chart One**, you may call any number in **Charts One** and **Two** at a local rate.

If the **first three numbers** of the telephone you are calling from appears in **Chart Two**, see the Special Instructions on this page

Chart One (Eugene-Springfield)

341	484	689
342	485	726
343	683	741
344	686	746
345	687	747
461	688	

Chart Two

Harrisburg	995
Junction City	998
Leaburg	896
Lowell	937
Marcola	933
Veneta	935

Toll Free Calling Area

Special Instructions

Free calling areas are determined by prefix and not necessarily by address

If the number you are calling from begins with	**896**	you may call all the numbers shown in **Chart One** and prefix **896**.
If the number you are calling from begins with	**933**	you may call all the numbers shown in **Chart One** and prefix **933**.
If the number you are calling from begins with	**935**	you may call all the numbers shown in **Chart One** and prefix **935**.
If the number you are calling from begins with	**937**	you may call all the numbers shown in **Chart One** and prefix **937**.
If the number you are calling from begins with	**995**	you may call all the numbers shown in **Chart One** and prefixes **995** and **998**.
If the number you are calling from begins with	**998**	you may call all the numbers shown in **Chart One** and prefixes **995** and **998**.

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Figure 8

After several frustrating attempts with the guide in Figure 8, I designed for my own use the matrix presented as Figure 9. Using only the headings and a single line at a time, all toll free calling areas can be quickly identified.

TOLL FREE CALLING AREA

Figure 9

LINE	A	B	C
	IF first 3 digits of number called from are (note 1)	THEN you may call toll free numbers beginning with	AND also these
1	341, 342, 343, 344, 345, 461, 484, 475, 683, 686, 687, 688, 689, 726, 741, 746, 747, Eugene-Springfield Numbers		896, 933, 935, 937, 995, 998.
2	896 Leaburg	341, 484, 689,	896,
3	933 Marcola	342, 485, 726,	993,
4	935 Veneta	343, 683, 741,	935,
5	937 Lowell	344, 686, 746,	937,
6	995 Harrisburg	345, 687, 747,	995 & 998
7	998 Junction City	461, 688,	995 & 998

NOTE: 1. The numbers in the matrix are the first three digits of those the Eugene area.

The Message Matrix will also outline relationships which have not yet appeared in print. My solar water heating system user instructions appear in Figure 10.

SUMMER SOLAR OPERATIONS (Note 1)

Figure 10

LINE	A	B	C	D	E	F	G	H
	IF hotter water is required when the supply tank reads	AND water pump is		THEN take actions below in order indicated (D-H)				
		Off	On	disconnect pump cord	then	and after	then	reconnect pump cord
1	80° F - 110° F (Note 2)	X			Engage Electric Circuit Breaker	40 minutes	Disengage Electric Circuit Breaker	
2			X	X				X
3	110° F - 130° F	X				30 minutes		
4			X	X				X
5	130° F - 140° F (Note 3)	X				20 minutes		
6			X	X				X

NOTES:
1. Between May-October each year, electric circuit breaker is in OFF position.
2. 80° is the average minimum solar temperature reading for summer.
3. Supply tank electric thermostat set for 140°-145° range.

This matrix provides the essential steps for system operation with minimal background details. *If* the user performs all tasks as outlined, *Then* the desired water heating will occur.

If in the future I decide to convey these instructions in text format, or give them orally, this matrix will become my presentation outline. Each line of the matrix, combined with the headings (a logic sentence) will become a lead sentence or statement, to be supplemented with additional detail as required.

The reader will recognize from the examples shown, that the matrix is valuable for instructions and procedures, plus other complex writing such as computer documentation. The majority of formats now in use (decision tables, specified action tables, decision logic tables, etc.) serve these purposes. Representative citations are included as References.

There remains an infinite variety of additional matrix applications to be generated by other imaginative and creative communicators. The examples which follow are indicative.

Information presentation represents a major promising area for matrix use. Figure 11 was designed to condense, represent, and completely substiture for a full 8½ x 11" page of single-spaced

This matrix reads from left to right. Each numbered line, when combined with column headings, becomes a complete and independent sentence. For example, Line 3 reads: ***IF the category of service desired is*** **meeting/special event speaker** ***AND the recipient will be*** **organizations & associations** ***THEN this format is suggested*** **20-40 minute presentation** ***FOR which these costs apply*** **none. (*Italics* indicate headings.)**

CONSULTING SERVICES SCHEDULE (Note 1)

Figure 11

LINE	A	B	C	D
	IF category of service desired is	AND the recipient will be	THEN this format is suggested	FOR which these costs apply
1	portfolio review-applied examples	individuals, groups, firms, or agencies	15-30 minute discussion	none.
2	writing/design consultation		contract or agreement	hourly rate plus travel.
3	meeting/special event speaker	organizations & associations	20-40 minute presentation	none.
4	to acquire the skills and techniques used in content analysis and Message Matrix design, and their subsequent application. (Notes 1,2)	seeking initial level competence	basic (3-hour) workshop	fees are negotiated, based upon location, time, group composition and level of experience.
5		experienced at level of basic workshop	intermediate (3-hour) workshop (Note 3)	
6		desiring to increase skills	Advanced (half/full day) seminar	

NOTES:
1. Service elements in this schedule are modified to meet individual client needs.
2. Workshops/seminar are designed for academic/continuing education certification.
3. Basic and intermediate are often combined into a 1 day format.

text. Both the original text and this matrix appear together as the centerfold of my professional brochure, to demonstrate Message Matrix capability. The matrix alone becomes the centerfold for my business card. Both the brochure and business card are client-oriented information, promotion, and marketing applications.

Line 3 of Figure 11 outlines a no-cost meeting/special event speaker service. This offer applies equally to the readers of this article. If your group becomes interested in a personal presentation, please contact me. If substantial travel is required, I would expect to recover only those out-of-pocket expenses.

During the information presentation described above, I use an eight page folio, which contains many of the illustrations in this article. This participant handout provides visual support during the oral presentation, and assists attendees to convey the techniques to others who were not present. Since the majority of matrix examples "stand alone", the folio contains minimal text.

Message Matrix design configurations generally follow the logic content to be communicated. All examples shown thus far have been horizontal; that is each is read from left to right. Combining column headings with line entries produces logic-based sentences. We are accustomed to this structure in ordinary text.

There are however other matrix formats available. A vertical design, is used when a few condition elements precipitate a large number of action elements. The number of vertical columns required to display such logical content along the horizontal plane could often exceed the space available. This situation is solved by using a vertical matrix format as shown in Figure 12. Provided below the figure, are the slightly altered reading instructions this graphic requires.

This matrix reads initially from left to right to select a rule action; then vertically down to rule column in order to identify the proper conditions. For example, Rule 2 reads: "*IF scheduling this activity for Saturday recreation* **outdoor swimming** *THEN the following conditions must exist* **sunshine with 80° F and over.**" (*Italic* portions are the condition-action headings.)

DECIDING SATURDAY RECREATION

Figure 12

		RULE		
RULE	IF scheduling this activity for the Saturday recreation	1	2	3
1	indoor basketball	Yes		
2	outdoor swimming		Yes	
3	golf			Yes
THEN the following conditions must exist				
WEATHER				
A	raining.	X		
B	sunshine.		X	
C	overcast.			X
TEMPERATURE				
D	variable.	X		
E	80° F & over.		X	
F	50° F & over.			X

The logic content of Figure 12 is identical to that shown in Figure 3. Rule 2 covers the same information in both matrices.

THE MESSAGE MATRIX—Why It Is Important

"You can't write clearly until, before you start, you know where you will stop."—Edward T. Thompson

We have seen how the Message Matrix handles complex incoming and outgoing communications, replaces difficult text, presents condensed information, supports oral presentations, and visualizes multivariate concepts. There are two additional areas in which the matrix technique is quite useful.

Mr. Thompson's quote advocates the first—a writing outline. For difficult and involved material, I find that the Message Matrix excels. We have seen that the combination of matrix column headings with any content line will produce a logic sentence. Each logic sentence contains a single, clear, concise, and complete thought. We also know that most writers utilize lead sentences to condense and focus content material for the reader. For all practical purposes, I find logic and lead sentences to be interchangeable. (See the discussion following Figure 10).

The other area—content analysis—normally is performed prior to matrix design, to isolate key factors of the intended communication. Distributing these elements in network format helps clarify the interrelationships. Even if a formal matrix is never completed or used, this logic examination of basic content will aid the subsequent writing.

Content reiteration may also be presented as a variation of an original writing outline. At the beginning of this article, I characterized the Message Matrix as a "gifted graphic" which would visualize intricate ideas and display them in a logic-based relationship framework. Figure 13 contains a summary which identifies, condenses, and locates the major concepts in this article. With a slight design variation, this same matrix could also be employed as a table of contents.

CONTENT-BASED ARTICLE SUMMARY

Figure 13

LINE	A	B	
	WHEN the message requires	THEN the matrix format will	AS identified by
1	dealing effectively with repetitive written content	incorporate the redundancies into the design framework	the discussion following Figure 3.
2	analysis for major content of material already in print	visualize minimum essentials in an easy-to-read format	Figures 8 and 9.
3	enhancement of oral presentations and training programs	furnish one illustration for both training and operations	the text surrounding Figures 4 and 5.
4	reduction of error potential in procedure interpretation	completely replace intricate text by easy-to-use graphics	Figures 6, 7, and the explanatory text.
5	using limited space to display maximum content	provide several suitable illustration formats	Figures 3 and 12 plus related paragraphs.
6	outlining the logic content of material prior to writing	replicate graphically logic content of original material	Figure 10, its discussion, and this summary.
7	client-centered promotion and marketing materials	conserve space and avoid involved narrative text	Figures 11, and the text which pertains.
8	an easy-reading, flexible, illustration frame	display complex communication in a logic-based format	the entire article.

In Closing

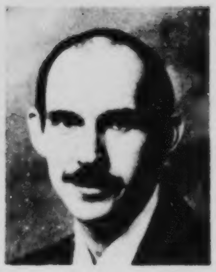
I hope you have come to recognize the Message Matrix as an exciting communication technique. It will cope with some of the most "tedious technical text". If we are seriously interested in easing the burden of the reader or user, the Message Matrix will contribute. I encourage your consideration of this vibrant and dynamic illustration format.

At the beginning of the article, each reader was asked to keep in mind some recent communication difficulty while reviewing the matrix applications provided. I am quite interested in the specific results of this interactive process. My "How-To" book still has space for additional creative entries. Your observations, questions, and comments are most welcome, and will convert this monograph into a dialogue.

IBM, *Decision Tables,* Application Development Center Education Guide, Paris, France, 1971.
McDaniel, Herman, *An Introduction to Decision Logic Tables,* John Wiley & Sons, New York, 1968.
Montalbano, Michael, *Decision Tables,* Science Research Associates, Inc., Palo Alto, 1974.
U.S. Air Force, *AF Pamphlet 5-5: Special Table Techniques,* Washington, D.C., 1974.

System/38 Syntax Diagrams: A Better Idea

Harold E. Anderson



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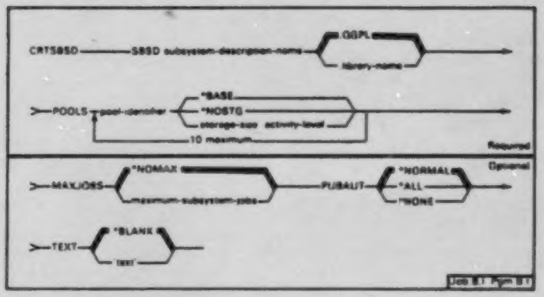
Problem: *Publication methods used to show the syntax of commands on earlier IBM systems would not have worked well for the IBM System/38. Previous methods lacked the flexibility to show, in an easy-to-understand manner, the wide range of syntax structures occurring in more than 400 commands for the System/38. A more graphic, yet simpler, method was needed to accurately and consistently illustrate the syntax of each command—its parameters and values—whether that syntax was simple or complex.*

Solution: *The graphic method developed for the System/38 syntax diagrams is similar to the old "follow-the-bouncing-ball" method that was used in movie theaters to encourage people to sing along with the music shown on the screen. Like a musical score, the System/38 syntax diagrams show units of information on lines that are read from left to right, top to bottom.*

For the user, the System/38 syntax diagrams clearly and accurately illustrate the sequence of each command's parameters, the values for each parameter, and the logical relationships among parameters and among values within parameters. In addition, the diagrams helped the system programmers who designed System/38 to develop a better, more consistent programming language for the system earlier in the development cycle. This saved programming resources that would have been needed to solve design problems later in the cycle.

INTRODUCTION

A syntax diagram is a graphic illustration of the syntax of a command or statement in a programming language. The primary purpose of a syntax diagram is to show the parameters and values that a computer user can specify for a given command. (When the command is processed by the computer, it performs the function specified by the user.) Also, to assist the user in coding commands, syntax diagrams should graphically display logical relationships among parameters, and among values within parameters.



The System/38 syntax diagrams were developed to document over 400 control language commands used by the IBM System/38 to perform its many functions. (The diagram for one of the System/38 commands is shown above.) This paper describes the characteristics of System/38 syntax diagrams, provides a few examples of how to document various syntax structures, and discusses the benefits of using the diagrams.

The Problems

The primary problem that led to the development of the System/38 syntax diagrams was the obvious need for a method flexible enough to clearly and accurately document the wide range of syntax structures occurring in System/38 commands, ranging from the very simple to the complex. The documentation method had to be consistent and easy to understand.

In addition to the varying degrees of complexity in System/38 command syntax, two other problems found in other methods of documenting syntax were also considered:

- Confusion caused by the use of pseudo-coding characters (characters that are used to define the syntax, but are never coded)
- Difficulty in determining logical relationships that exist among parameters and among multiple values within a single parameter

To illustrate these problems, the old method initially used to document System/38 command syntax is shown here to present the syntax of just one complex System/38 parameter, the SIZE parameter.

```
[SIZE({[10000|number-of-records][1000|increment-value]
      [3|number-of-increments]}|(*NOMAX))]
```

This example contains 19 pseudo-coding characters of four kinds:

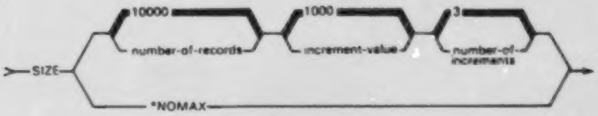
- Brackets [] for optional parameters
- Braces { } for logical groupings
- OR symbols (|) for logical choices
- Underlines (____) for default values

(The single set of parentheses shown would be coded if the keyword SIZE is also coded.) A user would have great difficulty interpreting the logical relationships of the values in this parameter, even if the meanings of these special characters were understood.

The key relationships in the SIZE parameter are:

- It can contain a list of three user-specified values, such as SIZE(3000 500 2). Each of the three values has a default if not coded. In this case, SIZE(10000 1000 3) would be used by the system if no values were specified.
- It can contain a single predefined value, SIZE(*NOMAX).

These relationships are presented more clearly by the method actually used to document System/38 syntax:



The Solution

As shown by the previous example, the type of diagram used for System/38 resolves the previously mentioned concerns. Several innovations have been made that make System/38 diagrams unique, more effective, and easier to use than many existing syntax forms. The System/38 syntax diagram method:

- Eliminates all of the pseudo-coding characters.
- Does not show parentheses, which are always used when coding is done in keyword-with-value form, but are never used when coding is done in positional form (except for lists of values). The *keyword-with-value* form is the all-caps name of the parameter followed by its value(s) in parentheses, and the *positional* form is the value(s) without the keyword.
- Uses return arrows to indicate the number of repetitions and to show exactly which values can be repeated and which cannot.
- Uses base and branch lines to show the logical (AND and OR) relationships, and uses heavier line weights to indicate the default values.

Also in System/38 diagrams, required parameters are clearly separated from optional parameters, boxes are used for grouping values (when appropriate), and additional information is provided in note form at the bottom (when appropriate) and in inset boxes in the bottom right corners.

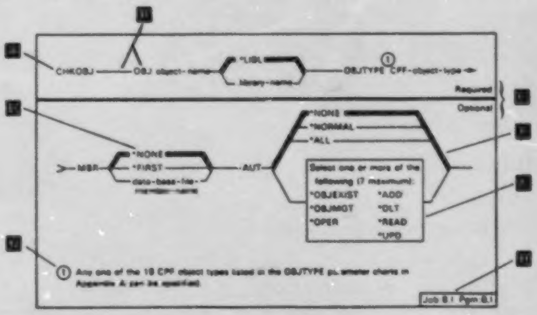
Design Goals

All of these innovations (some of which may have been used in other syntax documentation methods) were used in the System/38 syntax diagrams to accomplish the following goals:

- Present the command syntax information in the simplest manner. Use the least number of lines and pseudo-coding characters that are necessary to present the syntax completely and accurately.
- Present the various types of parameter relationships in a clear, graphic form. Without wasting space, show the logical relationship of one parameter to another, and show the logical relationships of the values within each parameter.
- Present each parameter with all its values as an easily recognized unit, identified by its keyword, and separated from other parameters. Also, for each parameter:
  - Show default values distinctly, for quick recognition.
  - When repetitions of values can occur, indicate which ones can be repeated and show the maximum number of repetitions.

CHARACTERISTICS OF SYSTEM/38 SYNTAX DIAGRAMS

Several characteristics of the System/38 diagrams contribute toward easy retrieval of syntactic information about a command. However, not all of these characteristics appear in every diagram; only those needed for each command are used. All of them *are* used in the following diagram of the CHKOBJ (Check Object) command, and are described below.


CHKOBJ
OBJ object-name
*LIBL
library-name
OBJTYPE CPF-object-type
①
Required
Optional
MBR
*NONE
*FIRST
data-base-file-member-name
AUT
*NONE
*NORMAL
*ALL
Select one or more of the following (7 maximum):
*OBJEXIST
*OBJMGT
*OPER
*ADD
*DLT
*READ
*UPD
① Any one of the 18 CPF object types listed in the OBJTYPE parameter charts in Appendix A can be specified.
Job 8.1 Pgm 8.1

A The diagram is boxed as a single unit, with the command name (CHKOBJ) at the beginning (top left corner). The parameters that follow the command name are read and interpreted using the normal reading pattern of left-to-right, top-to-bottom.

B A **base line** is used to show the correct positional sequence of all the parameters in the command (OBJ, OBJTYPE, MBR, and AUT). The base line is the single, thin, horizontal line that begins after the command name and connects each of the parameters in turn; arrow heads and tails are used as needed to show base line continuation.

C All the **required parameters** (OBJ and OBJTYPE) are separated from all the **optional parameters** (MBR and AUT). If both types exist in the command, they are separated by a heavy dividing line. If only one type exists in the command, that type is indicated in the upper right corner of the diagram.

D In most cases, all of the values for a parameter (from which one or more can be selected) are vertically stacked and are connected by **branch lines** whose ends join together with the base line. (The values that can be specified for the MBR parameter are *NONE, *FIRST, or the name of a data base file member.) A branch line, when selected, must be followed until it reconnects to the base line.

E Most **default values** are indicated by heavy branch lines on both sides of each value (default values occurring in boxes are underlined). The default (if any) for each parameter is assumed by the system if the parameter is not specified. (For example, if the AUT parameter is not specified, AUT(*NONE) is assumed.)

F If there are a lot of values for one parameter, all or a logical subset of them can be put in a **box** placed on a base or branch line. The box saves space and provides a natural place for syntax instructions in text form. (The syntax for the AUT parameter indicates that a single value of *NONE, *NORMAL, or *ALL can be specified, or that one or more of the values in the box can be specified.)

G When necessary, **notes** are included that give nongraphic, yet important, information related to syntax. The notes, indicated by circled numbers near the appropriate parameters, are listed at the bottom of the diagram.

H Additional nonsyntax information can be inset in the lower right corner. The information should be concise and should not detract from the main purpose of the diagrams. For System/38, **command entry codes** are shown that indicate where the command can be used. The entry codes *Job:B,I Pgm:B,I* indicate that the command can be used in batch (B) and interactive (I) jobs and programs.

Showing Logical Relationships

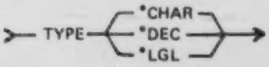
Several possible relationships can exist among parameters and among multiple values within the same parameter. How System/38 syntax diagrams handle some of the relationships among values *within a parameter* are discussed in this paper. Although relationships *among parameters* are also easily handled in System/38 diagrams, they are not covered here.

The following examples illustrate parameters where:

- Only one value can be selected from a group of values
- Multiple values can be selected
  - From one user-defined value
  - From multiple branch lines
  - From one branch line, each value being a different type

Specifying One Value From Multiple Branch Lines

If there is a choice of values and only *one* value can be specified for the parameter, the values are **mutually exclusive**.

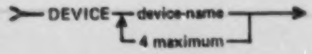


In the TYPE parameter, the three values are mutually exclusive. For example, if TYPE(*DEC) is specified, neither *CHAR nor *LGL can be specified.

Specifying Multiple Values From One or More Branch Lines

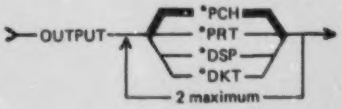
When *multiple* values of the *same kind* can be specified for a parameter, the values are called a **list of values with repetition**. In the diagrams, a return arrow is used to show both the values included in the repetition group and the maximum number of values that can be specified from the group.

- If one *user-defined* value (indicated by all lowercase letters) is shown with repetition, the user can specify one or more values for the parameter (up to the limit specified on the return arrow).



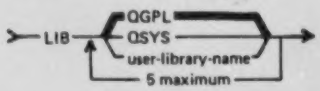
For the DEVICE parameter, as many as four different device names can be specified by the user. For example, DEVICE(PRINTER) or DEVICE(PRTR1 PRTR2 TAPE1 TAPE2) can be specified.

- If there is a list of *predefined* values (indicated by all uppercase letters) from which one or more can be selected, the values are mutually exclusive except as allowed by the specified number of repetitions. That is, you can go through the process of selecting one of the mutually exclusive values each time, for up to as many times as the repetition value indicates.



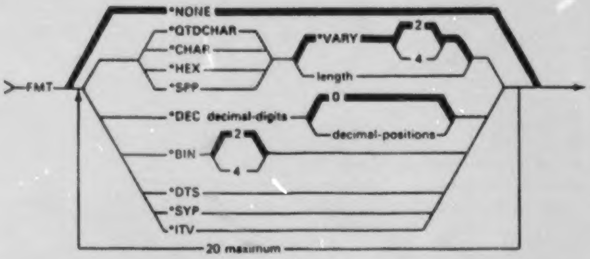
For the OUTPUT parameter, any one or any two of the four predefined values can be specified; for example, OUTPUT(*DKT *PRT) can be specified. Because all the values are predefined, each value can be used only once in the list being coded.

- If both user-defined and predefined values occur in a list of values with repetition, multiple user-defined values can be specified with one or more of the predefined values.



For the LIB parameter, as many as five library names can be specified. One or more user-defined library names can be specified along with either (or both) of the predefined values QGPL or QSYS. For example, LIB(LIBJANE LIBJIM QGPL) specifies two user libraries and the QGPL system library.

When *multiple* values of *different kinds* occur within the same parameter, they have **dependent** relationships. If one value must be specified before another value can be specified, the latter value is dependent on the first value. In the complex FMT (format) parameter shown below, one branch line shows the value *DEC followed by two dependent values: decimal-digits and decimal-positions (or a 0). These dependent values, which can be specified only if *DEC is specified, define the format of a decimal number—the maximum number of digits in the number and how many of those digits are to the right of the decimal point. Similarly, the groups of values on the branch line above the *DEC branch line also have dependent value relationships.



The FMT parameter is a good example of a complex parameter that clearly illustrates, with only the usual flow lines, several complex relationships. Its syntax contains a choice of 10 lists of values, of which nine choices can be used in repetition (up to a maximum of 20 times, in any combination). A coded example of three sets of values for the FMT parameter is:

```
FMT((*CHAR 15) (*DEC 5 2) (*BIN))
```

This example defines a character field of 15 characters, a decimal field of 5 digits (of which 2 digits are to the right of the decimal point), and a binary field of 2 digits (the default for binary).

BENEFITS OF SYSTEM/38 SYNTAX DIAGRAMS

From our experience in creating and using the System/38 syntax diagram method, we identified several benefits that can be gained if the diagrams are used to document commands or statements in a programming language. These benefits, both for the user who programs in that language and for the development team that uses the diagrams to design the language, can be summarized in three groups:

- Usability benefits
- Documentation benefits
- Language design benefits

Usability Benefits

The System/38 syntax diagram method helps the user to quickly understand parameter and value relationships, it minimizes the use of pseudo-coding characters, and it can be adapted for use with many programming languages because of its flexibility to handle a wide range of syntax structures. The diagrams:

- Work for languages that use either (or both) the keyword-with-value form or the nonkeyword (positional) form. For example, the name of a program can be specified as PGM(PROG2) or as PROG2.

- Can be kept as simple as possible by not showing information that consistently applies to every command. The less 'clutter' (unnecessary information) there is in the diagram, the easier the user can interpret and use the information.

- Work for languages that use different basic syntax separators.

- Work for both simple and complex commands without changing the format. Because flexibility in presentation is provided, additional mechanisms can be used when necessary to convey the information.

Documentation Benefits

As artwork in reference manuals, syntax diagrams provide the following documentation benefits for users. The diagrams:

- Act as the focal point within each command description.

- Eliminate the need for users to learn and interpret many pseudo-coding characters that are used in other syntax forms.

- Reduce the amount of text needed to describe the command and its parameters.

- Make the reference manual (which is normally a text-laden manual) more attractive and easier to read, by providing breaks in the text.

- Can be automated because of the exacting, precise structure and unambiguous form of the syntax.

Language Design Benefits

As a design tool used by system programmers early in the development cycle of a programming language, syntax diagrams can provide the following benefits. The diagrams:

- Help developers design well-structured commands and maintain uniformity among commands, as was done in the System/38 commands.

- Help developers clearly see the logical relationships among related parameters, and help point out logic errors.

- Help developers quickly see the overall structure of commands designed by other developers who are working on other parts of the programming system.

CONCLUSION

This paper has shown how the graphic syntax method used for System/38 commands clearly illustrates each parameter of a command as a logical unit of information. The values allowed for each parameter, its default value, the number of repetitions allowed, and all the logical relationships are presented in an orderly and consistent manner.

Besides being a useful tool for users of a programming language, this form of syntax, when used early in the development cycle, can help ensure consistency and clarity in the design of that language. During the design phase of the diagrams themselves, a major concern was: could every syntactical situation present in the System/38 control language be clearly presented in the diagrams? That goal has also been met.

The System/38 diagrams have been well received by IBM customers and System/38 developers. This documentation method has been an effective tool in providing users with vital information that contributes to the successful operation and productivity of System/38.

Technical Editors: Are Our Roles Limited?

Allen B. Martin, Jr., Moderator

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Consult ten technical editors in as many different companies, and you will find ten individual situations. Limiting and often frustrating factors will exist in each instance, but as the papers of this session indicate, the opportunities for challenge, growth, and service are always present and ultimately rewarding.

Dorothy C. Amsden's incisive and humorous *The Scientist's Guide to Obfuscation* evokes smiles and even laughter, but it also persuades us to discard our "Of course, I know that!" attitude. It makes us question whether we too are guilty of the same faults we seek to eliminate from the manuscripts we edit, and strive to avoid in our presentations.

At one point Ms. Amsden states, "Don't make it easy for audiences not in your immediate field. After all, *you* had to dig to understand *their* publications and presentations." We smile, but also reflect.

Ms. Amsden's excellent examples, mixed with constant humor, make us sorry her paper has an ending.

Dolores Lehr's *The Three Roles of the Editor* explores editing as a multifaceted task. Her treatment of the technical editor as Resource Person, Instructor, and Standards Bearer is well documented with actual situations and concrete details which are easily understood and appreciated.

Within the three major roles of the technical editor, she explores many other clearly defined minor ones. "Grammarian-in-residence," and "go between for the artists and writers" are two roles which are familiar to most of us; she presents them as challenges to be accepted, cultivated, and enjoyed.

Ms. Lehr's material can be very readily adapted to our own particular situations and needs. In addition, it is rich enough in content to be reread and referenced.

Saul Carliner's *Revisions: A New Writer's Challenge* examines various revision assignments he has completed, including his very first one, with all the accompanying difficulties, challenges, and satisfactions.

Carliner explains how disappointed he felt with his first revision responsibility, because he couldn't envisage his task as more than that of a "technical stenographer." We can identify with his frustration at having to revise various pages or sections of an already printed document, without the freedom to alter previous style, organization, or phrasing.

Carliner's paper is useful to all editors and writers who make revisions to manuals. Using precise examples, he differentiates clearly the restrictions and satisfactions found in preparing small, medium, and large revisions. Those assignments which he considered at first as limiting, and even depressing, revealed unexpected challenges and required developing new writing skills.

Stanislavsky often said about acting that there are no small parts, only small actors. That might also apply to technical writing and editing tasks.

The Scientist's Guide to Obfuscation*

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Whether in publishing learned articles or speaking before peers, scientists have a time-honored tradition of obfuscation to emulate. The underlying precepts of that tradition are set forth in this paper. Specifically, write or speak to impress, certainly not to inform. Ignore the audience. Present material in random order. Maintain the suspense. Cultivate an unreadable style. Enhance papers and talks with uninterpreted raw data. Pack visuals. And, most important, keep the audience in the dark. Practitioners of these precepts cause little stir in the scientific community and some even go entirely unnoticed.

INTRODUCTION

I often hear scientists complain that they wasted time attending a presentation from which they learned nothing. The visuals were terrible and the talk was so disorganized that they gave up trying to follow it. I also hear scientists grumble over the immense pile of reading they have to do to keep up with their fields of interest. Why can't authors come right out and say what they mean instead of beating around the bush? Of course the problem always lies with other scientific publications, never with one's own, which are perfectly clear to the originator.

This guide is primarily for scientists. Only they can truly appreciate the frustration of trying to penetrate another scientist's unintentional obfuscation. I hope that this guide will help them use obfuscation only when they deliberately mean to and the rest of the time to recognize it and expunge it from their communications.

Twelve years of editing scientific manuscripts have taught me a lot about obfuscation. Fortunately not all authors practice this time-honored tradition, but I was able to compile a set of principles from sufficient manuscripts to set forth a guide. First we'll see how obfuscation can be applied to scientific writing and then to oral presentations. I encourage you not only to read the text, but between the lines as well, for there you may glean some useful advice about communicating with an audience.

WRITE FOR YOURSELF

In writing for yourself, be sure to practice the principles of poor writing that Paul W. Merrill of the Mount Wilson Observatory proposed in 1947:[1] "Ignore the reader; be verbose, vague, and pompous; do not revise." The following techniques, which update his principles, will help you promote your self-interest as well as ignore your readers, mislead them, and encumber them with an unreadable style of writing.

Promote Your Self-Interest

Write to enhance your prestige.[2] Impress your readers rather than inform them. "An unintelligible communication from a legitimate source in the recipient's area of expertise will increase the recipient's rating of the author's competence," according to the Dr. Fox hyphothesis.[3] Another technique for impressing the audience is to drop names of people and theories in passing. "Those of you familiar with Brown and Smith's work will recognize...," but don't explain what their work was.

Show how hard you worked. Recount everything you did. Tell how the equipment arrived damaged in shipment and how you had to wait 6 months to get replacements. Tell what you did in the meantime. No matter how inconsequential a piece of information may seem, include it in your presentation. Don't make your work look effortless or no one will appreciate what you did.

Write so you can attend the conference. Even if you have nothing new or significant to report, submit a paper so you can go to Seattle, San Francisco, Toronto, Hilton Head, Versailles, Tokyo. The paper is your ticket to travel. No one will pay your way just to listen.

Cultivate your list of publications so it will grow and flourish. Publish frequently, whether you have anything to say or not. If you can publish several related papers separately instead of combining them into a major report, by all means do so; they will lengthen your bibliography.

Ignore Your Audience

Write for yourself and perhaps one or two others in your immediate field. Never mind that your subject is remote from the experience of most of your peers. Assume that your readers will be motivated enough to struggle through the prose to understand your meaning. Less motivated readers can just pretend to understand; your seeming command of the subject will cause them to attribute their confusion to their own inadequacies rather than to those of the author.

You have no obligation to communicate with readers outside your immediate field. Don't try to relate to common experience before you present your detailed findings; it's not worth boring a few already knowledgeable readers to initiate all the others. Leave out introductions, transitions, and other superfluous orientation. You're writing for the motivated reader. Besides, you have to struggle to understand other scientists' publications, so don't make it easy for them to understand yours.

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*This work was performed under the auspices of the U.S. Department of Energy.

Dispense with logic. Start your articles and presentations with the first thought that comes to mind. This allows you to report your findings in random order.[4] Stream of consciousness is a perfectly fine method for organizing a paper and requires little thought. Leave a few holes in your logic so the reader will wonder how you got from point A to point B.

Hide the conclusions, if you present them at all. Scatter them among all the sections so that the casual reader will never find them. Anything worthwhile is worth searching for. Shun executive summaries at the beginning of a report; they give away the ending. Such summaries have a nasty habit of satisfying busy people who then never bother to read the rest of your report. Your goal is to make them read it all, in sequence; if they try to skip a part it will sabotage their understanding. You had to work writing the report; let them work to read it.

Because you don't want your document to be more clear than necessary, avoid revising your manuscript. The first draft will do and you can stop wasting time and get back to the laboratory. A corollary to this precept is, don't ask your peers to review your manuscript before publication because they might identify points for you to resolve that not only will encroach upon your time but may also require you to do more work.

Resist telling readers what the subject is or why they should care about it. Assume they already know that your device counts cells or your code determines inventory differences. Nor do you need to explain why you invented the device or created the code. Begin with the details of how you accomplished your work. Write a good opening sentence, such as one taken from a recent progress report that reads "This system includes wiring between the remote terminals/instruments and the computer, diagnostic programs, and diagnostic equipment." Then lavish great detail on the manner in which the mechanism operates or how the computer code performs a certain calculation. This facilitates the writing process, fills the page requirement for publication, and requires little effort to generate.

Maintain the Suspense

Never state the obvious, at least what is obvious to you. When readers have to guess what you mean it will keep their attention. For example, if studies of offsite radiation from a nuclear power plant reveal that radiation levels are well below the maximum permissible level you don't have to state that fact or mention what the maximum permissible level is. You only need to report the radiation levels that you detected. The readers are responsible for knowing whether the emissions are above or below the prescribed level. Of course health physicists and nuclear regulatory officials will know that level by heart. Few others will, although they may be the ones who influence whether the plant continues operation or is shut down.

Eschew selectivity. Tell readers everything you did. No need to distill your findings. Let them discover the essence of your work for themselves. The rule of thumb here is to provide 7 tables and 16 graphs for every 10 pages of manuscript. Even though you know that only one or two tables and graphs are really significant, you want to give readers the whole picture without prejudicing them.

Include all your raw data. Put it in the body of the text where readers must wade through it; don't relegate it to a remote appendix. Here is the pride and joy of your investigation: the myriad of computer printouts that constitute the basis of your work. You spent countless hours, sometimes years, assembling all these data. Then you slaved over them to find trends and establish relationships. Obviously, your data are the focus of your presentation. No need to mention the approach you took nor dwell on the trends and relationships.

Avoid interpreting your data—the meaning should be obvious to knowledgeable readers. The data speak for themselves; no need for you to intercede. For example, "the effect of vehicle size on background radiation is illustrated in Table I" is preferable to "background radiation varies inversely with vehicle size (Table I)," because it obliges readers to study the table before understanding the trend. Don't draw conclusions or justify them; just spell out the facts for the readers to sort out as best they can.

Mislead readers with irrelevant titles, headings, captions, and references. Entitle your manuscript with something vague that only slightly pertains to the content. Give your sections or subsections meaningless headings, or better yet, don't label them at all. Impart only minimal information when you write figure captions or table headings. For example, the scientist who wrote the original caption for the graphs in Figure 1, "Total efficiency along the vertical and horizontal 4-ft axes through the center of the crate," thought the graphs were so obvious they needed little explanation. What he really meant was, "The detection efficiency is constant (roughly 13.3 ± 0.5%) for two of the three matrices. The extremely high water content is responsible for the lower efficiencies observed from the wet sawdust matrix."

Cultivate an Unreadable Style

Confound your readers with imprecise, pompous, dull, and wordy prose.[5] Make the sentences so ponderous that readers may have to ingest three cups of coffee while mulling each of them over before they understand your point. Rejoice if you can write "The interpretation of the legitimacy of the reported BPID is dependent on the inspector strategy for inventory verification, and the historical records, including previous BPIDs and process, procedural, or measurement

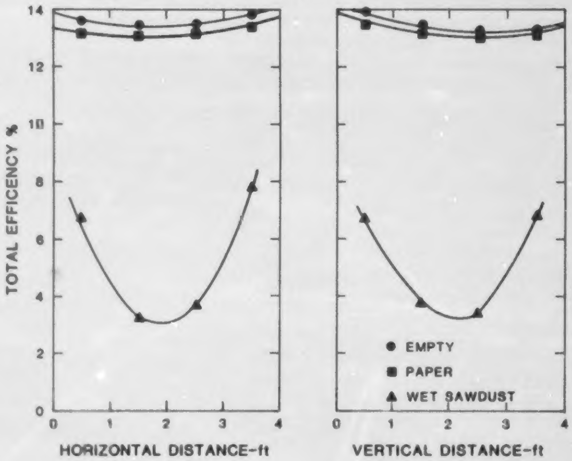

Figure 1
An obvious caption would describe what readers could see for themselves without explaining why the third curve was so out of keeping with the other two.

alterations over the historical span." Confidently commit Freedman's seven sins of indifference, fuzziness, emptiness, wordiness, bad habits, deadly passive, and mechanical errors.[6]

Spurn consistency of terminology. Use as many synonyms for the same object as you can: refer to your creation as a device, an instrument, a mechanism, a unit, an assembly, a contract end item. When you tire of synonyms, resort to such object pronouns as this and these, the latter, the preceding, the penultimate, the following. It is particularly satisfying to deploy the aforementioned so that readers aren't completely sure which referent you mean.

Abolish prepositions. Apply the stacked modifier noun freight train approach,[7] and omit the hyphens that link related modifiers to trip up unsuspecting readers. Write thus, "Enhanced differential dieaway technique fissile isotope assay sensitivity has been obtained by...." The fact that the creators of this quote succeeded in enhancing the sensitivity of their system for assaying fissile isotopes by means of a differential dieaway technique is hidden in the verbiage. They wanted to cram it into one succinct phrase and then get on with the interesting part of how they solved the problems. Freight-train constructions conserve prepositions.[8] By abolishing prepositions you may be able to condense an entire paragraph into one sentence.

Write complex Joycian sentences. Research shows that the longer the sentence the more difficult it is to understand. Forty- and fifty-word sentences will inflate your readability index to post-doctoral levels and lead your audience into the fog.* Be confident that if James Joyce could write brilliantly about quarks, so can you. Aim for a readability index of about the 26th grade for most of your work. That would mean writing 40-word-long sentences of which 25 words have three or more syllables.

Disdain paragraphing. Recognize that a solid page of text with no indentations looks so much more impressive than one with several paragraphs. Combine paragraphs whenever possible.[5] You want to attract the courageous reader, not the timid one who blanches at dense pages of heavy reading with no white space for relief. For every hundred readers who turn away, one will struggle to follow your train of thought.

Now that we have examined the precepts that guide some scientists in their writing, let us see if they also pertain to oral presentations.

SPEAK TO YOURSELF

To whom are you speaking? Peers, management, the general public? Can you see anyone in the darkened auditorium? Is anyone there? Are they listening? Proceed as if you were the only one present. This frees you, the speaker, from worrying about the legibility of the visuals, voice projection, word choice, logical presentation of ideas, or other such irrelevant factors. As you see, most of the precepts from the preceding section on writing also pertain to speaking. However, oral presentations have some special requirements of their own.

Keep the Audience in the Dark

Make sure the lights in the conference room are turned down all the way so no one can see you. This will allow you to forgo preparing notes and give your talk ad lib. Don't worry if your points are somewhat out of order or if you leave out a few that you meant to make. A pitch black room also ensures that no listeners take notes while you speak. Now they can't steal your ideas because they probably won't remember much from your talk. Needless to say, don't provide them with a handout.

Address the projection screen—avoid eye contact. Although it is easier to ignore your audience when you write, if you must appear in person, pretend that you are alone in the universe. Mumble quietly to yourself as you face the screen.

Disorient your listeners. Omit the title transparency. Begin by projecting your most complex transparency. They will wonder what you are proposing to talk about and even who you are. A little anonymity may be useful.

Two presentation plans help speakers determine their approach. Plan A is for speakers who have too many transparencies to show during the allotted time. Sequence through them quickly and in random order so the listeners don't quite have time to see everything on them. Talk about number 3 while number 4 is on the screen. Run over your time. If you still don't finish before your time is up, explain to the audience that you haven't gotten to your most important point and that they can see you after the session.

Plan B is for procrastinators. It allows you to present your entire paper with only a few transparencies. You didn't have time to make up word charts, so you will probably be showing out-of-date photographs and last-minute sketches of equipment. Explain what changes have been made since the photographs were taken. When you have no transparency for a particular point you are trying to make you have three recourses: speak with the preceding transparency still on the screen, project nothing on a glaring screen, or insert a blank to blacken the screen, leaving the audience entirely in the dark listening to your disembodied voice.

If your presentation is sufficiently confusing it may lead to a question-and-answer session following your talk. Misinterpret your interlocutor's questions and be sure to give evasive answers. This will ensure a dialogue of reciprocal misunderstanding and further obscure your message.

Neglect Your Visuals

Pack your visuals with data. The more you can put on a graph or illustration, the better. A graph with seven curves is much more cost-effective than one with the recommended maximum of three. Your cost savings are more important than the time it will take the viewer to decipher your data. Project transparencies of engineering drawings whenever you can because they are so precise; never mind that the fine lines and careful lettering are lost when they are reduced to 20% of their original size. Combine as many ideas on a single transparency as you can, even though you've heard a person can assimilate only six or seven facts at a time. With a little planning, you might even be able to do an entire talk with just one transparency.

A corollary to visual density is illegibility. Project lettering that is too small for the audience to read, such as an entire typewritten page of text or a computer printout. "I didn't have time to graph my results, but here they are anyway." This proves you've done the work. The audience will understand that you are wrapped up in more important things than plotting points for their edification. They will make an exception for you, even though they know that the main reason for using visuals is to reinforce the spoken message.

Procrastinate until the last minute to prepare your visuals. This way you can do them yourself in your own hand, like Leonardo da Vinci. Hand letter your Vugraphs with a broad-nib, nearly dry flow pen. Make changes and corrections while you talk. An advantage of drawing your visuals yourself is that no one will try to dissuade you from placing 37 partial differential equations on one Vugraph.

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*The Gunning-Mueller fog index is a way to compute the years of schooling needed to understand a piece of writing.

Fill an entire Vugraph from edge to edge and top to bottom. Project vertical slides or Vugraphs that are too long to fit on a horizontal screen. This introduces a little motion into a static talk as you move your Vugraphs up and down to show different parts of the figure. Project a lengthy table that overflows the screen and move it up and down to test your audience's memory for relating column headings at the top with totals at the bottom. Slides, unfortunately, afford less flexibility for vertical movement.

CONCLUSIONS

Now that you recognize obfuscation in its many forms you are prepared to use it deliberately or banish it entirely from your speeches and publications. If you have read this guide carefully, between the lines, then you also know how important it is to consider the audience's needs. It is no longer expedient for scientists to contribute to the time-honored tradition of useless[1] writing that keeps knowledge neatly stratified, accessible only to the initiated few. The fate of scientific discourse rests with its practitioners. What are you doing to further the cause of obfuscation?

ACKNOWLEDGMENTS

I am indebted to the nameless scientists and engineers whose manuscripts and presentations I have edited over the years for providing me with examples for this paper. Many thanks to the scientists who reviewed my manuscript and offered helpful suggestions for revising it. In particular, I thank Henry F. Atwater, Robert C. Bearse, Paul E. Fehlau, Richard E. Malenfant, John J. Malanify, and Calvin E. Moss.

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Three Roles of a Technical Editor

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ABSTRACT

Editing is a multifaceted function. While editors perform a variety of related tasks as proofreaders, copy editors, and substantive editors, they can also assume additional roles in working with writers. In carrying out their editing, they can effectively function as resource people, instructors, and standards bearers. As resource people, they act as reference, acquisition, and circulating librarians—providing ready answers to questions on writing, acquiring materials to aid writers, and circulating these materials among them. They also can serve as instructors, tutoring writers on matters of style and diction and leading seminars and workshops for them. In addition, technical editors can function actively as standards bearers both establishing guidelines for writers and enforcing adherence to them. These three roles, if consciously cultivated, work to produce more readable documents.

INTRODUCTION—NONTRADITIONAL ROLES

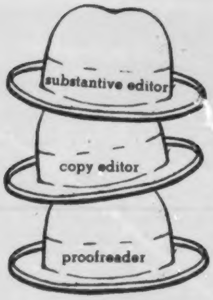
A technical editor, as we all know, assumes many roles. At various times most technical editors function as proofreaders, copy editors, or substantive editors—checking for spelling and grammar, reviewing style and diction, examining structure and content. While most editors are quite conscious of these traditional roles, they are less conscious of other nontraditional ones. Whether in a small company or a large publications department, editors often assume various roles, which all aid in producing clearer and more readable documents. Although these roles can range from writer and researcher to supervisor and manager, three of the more prominent ones are resource person, instructor, and standards bearer. While the tasks for each of these are not always obvious, they nevertheless are an essential part of many editors' work. Conscious cultivation of these roles can help to make an editor's work not only more effective but also more rewarding.

RESOURCE PERSON

Whether working in a large publications department or a small company, most editors function in some way as a resource person—providing information on correct style to writers, typists, managers, and other personnel. As an editor one frequently gets calls or requests for quick answers to questions on style, punctuation, or grammar. For example, on a typical day in my department, a writer might call to ask whether re-initialization is hyphenated, while another one might stop by, puzzled by an abbreviation for "engineering" in an older document. In a small company where I formerly worked, I often received such inquiries from the staff—managers, secretaries, and others—who saw me somehow as a "grammarian-in-residence."

While cultivating this role as a ready reference for writers and staff is helpful, an editor can also function as a resource person by putting together a small library of technical books and periodicals and circulating them. If there is a large budget, an editor can order many such publications; but even with a small budget, one can purchase some. These might include such basic reference guides as *The Chicago Manual of Style*, the *GPO Style Manual*, or the *New York Times Manual of Style and Usage*. An editor might also purchase some specialized dictionaries like those for electronics, engineering, or computers and some basic books on writing or graphics. In addition he or she might order some relevant periodicals or samples of literature produced by competitive firms.

In our department, occasionally writers see advertisements for competitors' products similar to what they may be writing about and ask me to send for literature on them. When I receive this literature, I usually circulate it or a notice about it. In a similar manner, I order books on writing or reference guides that writers suggest and route them. I also regularly route such periodicals as *The Editorial Eye*, *Simply Stated*, the *Journal of Communication*, and STC's publications.



resource person

instructor

standards bearer

Writers generally respond quite positively to editors in these various roles. In our department, a surprising number of writers and staff use the technical library located in my office. They often seek my help in getting information from a style guide or borrow dictionaries and competitors' manuals. And when the circulated periodicals come back, there are often comments scribbled in the margin agreeing or disagreeing with particular articles.

INSTRUCTOR

Another role that editors can consciously cultivate is that of instructor. Editors often unconsciously assume this tutorial role in the informal one-on-one conference with a writer.

Most editors see a writer's work in various stages—outline, draft, layout, and possibly final copy. While each company's production cycle varies, most companies allow the editor to make corrections that go back to the writers and then to discuss with the writers any necessary changes. At this time ideally an editor can assume the role of tutor by not only pointing out the correction, but also explaining why the correction was made. In my department a writer and I usually have the opportunity for the open discussion and disagreement that comes with any instruction. Generally we meet in a small conference room or my office. At these scheduled meetings I usually try to explain to and convince a writer why a sentence is clearer and less wordy in the active voice or why parallelism helps to make a passage more readable.

In a more formal fashion, an editor can instruct writers on these and other problems in a seminar session or workshop. In a seminar, an editor can review basic rules of punctuation, and discuss style, diction, or other matters of good writing. Last year, for example, I began a series of sessions in our department using examples from competitors' literature to illustrate common mistakes like the overuse of passive voice or dangling modifiers resulting from the avoidance of second person "you." Later, these sessions turned into discussions on researching, organizing, and presenting information. Currently these workshops have evolved into presentations by the writers on various aspects of a new product they are researching. In the current setting I serve only as a facilitator.

More formal, of course, is the actual teaching session for those outside an editor's department. While such courses given to the staff or a particular group such as engineers may not seem directly to help with an editor's goal of producing more readable documents, they do help indirectly. By demonstrating to management and technical people the importance of good writing and the difficulty of producing it, an editor gets more support and cooperation for his or her writers from people who often supply necessary information to them.

Generally writers appreciate the editor's assuming this role of instructor. Certainly most writers appreciate the one-on-one discussions of particular aspects of their work, although the response to the more formal class may not be as positive if the subject doesn't seem directly related to their immediate concerns. Most writers come to a lively presentation on a subject indirectly related to their work, and all probably look forward to a workshop where they can actively participate.

STANDARDS BEARER

While editors can wear the hats of librarian and teacher, they can additionally wear the hat of standards bearer. To varying degrees, most technical editors are given the task of establishing and maintaining publication standards—both written and graphic.

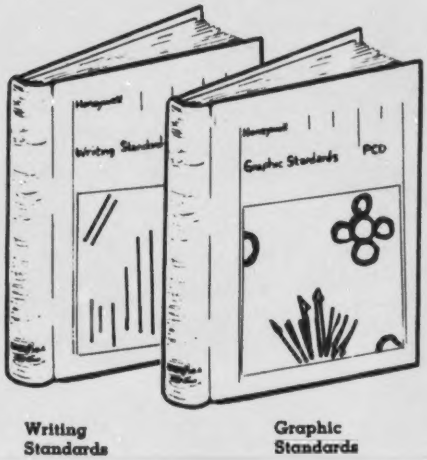
To establish writing standards, an editor can serve as a committee chair and solicit ideas from writers on approved practices. Or an editor can act as sole author in determining them. He or she might, for example, decide what dictionary or style manual the department will use or what format writers will use for punctuating lists or designating numbers. As these policies are established, an editor can issue a series of memos to writers and staff informally. More formally, he or she might codify these policies within a volume and issue it as the writing standards.

In establishing graphic standards, an editor usually needs to work closely with an artist or an art department, if one exists. To an art department a technical editor usually serves as the writers' representative. Working with the artists, an editor can set up guidelines and publish them in a fashion similar to those for writing—either through memos or in a volume. At my company, for example, we have put together in a three-ring binder our *Graphic Standards,* a set of guidelines which governs the presentation of all our domestic and international literature. In it, we give rules for laying out text, specifying type size, and placing headings and captions. The editor who preceded me helped to codify these standards, and I now serve on a graphic standards committee to continually update them.

Along with the task of establishing standards is, of course, the task of maintaining them. In our department, I play the role of enforcer of writing standards generally in reviewing drafts, while I check graphic standards mainly at the lay-out stage and thus work closely with the quality control person from the art department and the production people. More often, I act as a go-between for the artists and writers throughout the whole production cycle, explaining their different positions to each other and interpreting the standards as I understand them.

SUMMARY—THE FUTURE

Technical editing is in many respects a multifaceted function that includes more than proofreading or copyediting. As companies can afford to purchase "electronic editors" to perform these tasks, technical editors increasingly will be called upon to assume other roles. If they consciously cultivate the three outlined above, they can increase their effectiveness in working with technical writers and thus produce more readable documents.



Revisions: A New Writer's Challenge

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ABSTRACT

Revisions may be common assignments for technical writers in many industries, but they tend not to be popular assignments. This paper looks beyond the apparent drudgery of revision writing to show how it can be an apposite vehicle for training new writers.

INTRODUCTION

Revising publications is a common assignment for technical writers in industries that modify products during the product life cycle, such as the computer or automobile industries. Revising is also a common assignment for writers of other types of technical publications, such as textbooks and encyclopedias.

Writing a revision has the reputation of being a lackluster assignment. This is supposed to be especially true if the assigned writer did not write the first version of the publication. I wondered, then, how a writer could be challenged maintaining a publication he did not create, and writing material which essentially is not new?

I pondered these thoughts as I received my first technical writing assignment, revising the *IBM System/38 Problem Determination Guide* (a manual that tells customers how to identify, and if possible solve, problems with their computer). Revisions are a common first assignment because they are excellent vehicles for training new writers in the company writing process. The book was well written; the author was formally commended for his work on this new publication. When I first learned of the assignment, I was disappointed. I did not think it would offer me the opportunity to achieve my goals at that time–to prove my writing ability, to affect product development, and to be responsible for a manual.

I had much to learn.

THE REVISION ASSIGNMENT

I learned that most revisions, like soft drinks, come in three sizes: small (less than 30% of the pages of the original publication need changes); medium (30% to 60% of the pages need changes); and large (more than 60% of the pages need changes).

My first task was to classify the revision of the *Problem Determination Guide* into one of these three categories. To do this I had to estimate the number of pages affected by changes. I knew right away that certain pages would change: the edition notice, title page, contents, and index. Estimating the number of pages affected by technical changes was more difficult. Determining which pages to change requires a good working knowledge not only of the publication, but of the product itself: how customers use it, how developers created it, and how new features improve it. How, for example, would the addition of an option on the computer to display the job invocation stack affect the section in the manual telling readers how to display information about jobs (work that the computer performs). Learning such technical information became a short term goal.

Then I computed the percentage of pages requiring revision. As it turned out, I would be writing a small revision to the manual.

With small revisions, the modifications might have a major impact on how the product is used, but only a minor impact on the publication. Sometimes small revisions involve so few pages that we send only the changed pages to customers, who collate them into their copies of the publication. Modifications to System/38 affected pages scattered throughout the *Problem Determination Guide*, enough pages to justify reprinting the manual.

Small revisions are economically practical, but place two significant restrictions on the writer. First, the writer must follow the established style of the publication so that he does not confuse readers with a second style of writing. Second, to limit the number of changed pages, the writer must avoid work on sections unaffected by technical changes even if such work would make the sections easier to read.

Initially, I was frustrated with these constraints. Because I was unfamiliar with the subject matter, I expected to have a limited technical involvement in the assignment, but I hoped to be heavily involved in writing the publication. Instead, I felt I was little more than a technical stenographer. To keep the revised pages consistent with the original manual, I had to use certain phrases I did not like. For example, when referring to the process of copying information from the computer's main memory, the manual said *take a main storage dump*. I preferred a more formal version of the phrase, *perform a main storage stand-alone dump*. But that rewording would have affected many pages in the manual that did not have to be revised, so I dropped the idea. I also overlooked such details as the wording of chapter references. For example, references to Chapter 8 always read: *Before Calling for Service (Chapter 8)*. I persistently wrote: *Chapter 8 (Before Calling for Service)*. When the editor noted the error, I thought her concern was much ado about very little. She reminded me that I had to consider the whole book. She was right: consistency, down to the finest detail, is important in revisions. What seemed to constrain me actually was my lack of discipline as a writer.

With the editor's help, I learned to develop an eye for detail and challenged myself to check my writing against the prevailing style of the publication. The more I did this, the more inconsistencies I noticed between my revision and its original. Removing them became another short-term goal for the assignment. For example, I tried to match descriptions of new completion qualifiers (codes that System/38 displays after it tests communications between it and devices in another location) with completion qualifiers already described in the manual.

I was proud that my editor complimented the consistency between the revision and its original during her final review of the manual.

But I was far from achieving my first goals, and was anxious for a more challenging assignment.

A LARGER ASSIGNMENT

That assignment came soon. After I sent the small revision to the printer, our writing department began documenting another package of modifications to System/38. As part of that effort, I would write the next revision to the *Problem Determination Guide*.

Once again, I started the assignment by determining the extent of the revision, but this time I could do so just by reading the source material. I knew, for example, that additional information to be displayed by the computer about jobs would drastically change the section in the manual describing how to solve problems related to jobs. I determined that, this time, I would be writing a medium revision to the manual.

When writing medium revisions, writers often add new chapters to the publication because new technical material does not fit into the existing publication. With this revision, I would have to add a chapter or appendix to describe a new report to be generated by the computer.

Writers are also encouraged to do editorial housekeeping when writing medium revisions. We may add art to illustrate explanations, rewrite sections that might confuse readers, and pare down chapters that get overstuffed with information. For example, I would have to condense the chapter about job problems to accommodate the changes made at both revisions to the *Problem Determination Guide*.

Despite the flexibility to "clean house," a medium revision is not a license to rewrite the publication. The writer must still live with many of the same constraints that characterize a small revision. I learned from my initial assignment that these constraints can help discipline my writing. They can also make writing easier. As part of the present assignment, I added new sections to the manual (which I did not do in the small revision), but did not have to spend much time organizing them because I followed the organization of similar sections. For instance, much of the new *BSC Link Test* (a procedure for testing the telephone link between System/38 and devices in another location) was similar to the *SDLC Link Test*, a procedure already described in the manual. I tried to write the two tests as similarly as possible. And descriptions of new indicator codes (codes displayed when the system stops running unexpectedly) seemed to write themselves because they matched descriptions of indicator codes already in the manual.

Most of the time that I saved in writing was spent working on the technical aspect of the job. I was documenting more complex material than in the small revision, requiring a keener technical insight and closer work with developers. Those developers now sought my technical advice too, and included me in the implementation of product specifications: I worked with product developers to establish criteria for interpreting a report on communications between System/38 and devices in another location.

The rest of the time that I saved was spent on editorial housekeeping. The first author of the manual asked me to work on an appendix, because it needed an introduction as well as greater consistency with the rest of the manual. In addition, I condensed a group of related charts into a single chart, and eliminated less-important headings from the contents to make information easier to find.

As I made these changes something unexpected happened: some of my technical reviewers were reluctant to approve rewritten sections of the publication because the changes were primarily editorial rather than technical. The reviewers wanted me to prove that those sections were easier to read, so that readers would see improvements, not mere changes. Then I understood why the constraints existed: to keep writers from making impulsive changes. Before I attempted any more editorial housekeeping, I made sure I could justify the effort.

I realized that the changes that actually improved the manual were limited to small parts of it. I still did not change the phrase *take a main storage dump*, because it affected too much of the manual. I decided, too, not to divide two chapters into smaller ones, because that change would be primarily cosmetic. Instead, I added subheadings to better identify information within the chapters.

I found writing the medium revision more satisfying than writing the small one because I felt like I was beginning to realize my first goals. From the technical standpoint, working more closely with the technical reviewers gave me the opportunity to understand and affect the product I documented. From the writing standpoint, I could point to sections of the manual and say, "Hey, I wrote that." I especially appreciated the first author's compliments on some of my changes. I also noticed I was working more independently. For example, I decided without an editor's help which editorial changes were appropriate.

And when I finished this revision, I was ready for an even more challenging assignment.

REWRITING A PUBLICATION

Soon after I started writing the medium revision, that challenge presented itself. We received a request to rewrite the *Problem Determination Guide* and I was asked to do the work–clearly a large revision.

In some large revisions, the technical material changes so drastically that the writer must rewrite whole chapters, and possibly reorganize the entire publication. In this case, new information indicated that we might present the technical material in a new format.

This revision involved substantially more work and responsibility than did its predecessors, and keeping abreast of it required all the discipline I could muster. Before writing, I had to present an information plan, justifying the rewriting effort, and explaining in detail how I planned to rewrite the manual (rather than counting which pages I planned to change).

While researching, I was expected to identify problems with the technical material. I found a new report that the computer would generate to be inconsistent with reports already generated by the computer. At my instigation, the inconsistency was corrected. Some developers also involved me in the design process, asking for my opinions on their plans: one team of developers, for example, wanted my suggestions for simplifying information that would be displayed by the computer. As a result of this effort, some of my suggestions were incorporated into the final product.

While rewriting–reorganizing chapters, changing presentation techniques, and eliminating jargon–I developed a detailed format for presenting technical material and a consistent manner of writing information, such as using similar phrases to describe similar completion qualifiers. I documented these style elements in a style guide for an editor or another writer to refer to. Still, I had to observe certain style constraints. I had to keep terms consistent between the different versions of the manual. While I could finally switch to *performing a main storage stand-alone dump*, I still had to call the process a *stand-alone dump*. Changing that technical term would affect other publications; besides, readers already knew it.

After writing, I took an active role in planning the test of the rewritten *Problem Determination Guide*. This test would indicate whether my work improved the manual. Rewriting a publication that readers have already seen and used is risky; the improvement should justify the expense, and, until it is tested, no one has proof that this will happen. Fortunately, the test was successful and the rewritten *Problem Determination Guide* has received an enthusiastic response from customers.

Writing the large revision was the most rewarding of the three assignments. It let me use my writing skills, affect product development, and take personal responsibility for writing a manual. The earlier revisions prepared me well for this assignment, and I realized now that I could not have handled this type of work earlier in my career.

CONCLUSION

At first I thought writing any revision would be depressing. I did not see how a writer could develop and use his skills writing this type of material. Through the sequence of revisions, however, I found I had increasingly challenging assignments. Each one tested my developing technical writing skills by imposing those constraints necessary to discipline my work.

The small revision was an excellent assignment for me as a beginning writer. I did not have to develop the style and organization of the publication; this was fortunate because I did not have the technical knowledge or writing experience to do this successfully. Instead, I had time to develop a technical knowledge base and practice those rudimentary writing skills introduced to me in college.

The medium revision was appropriate when I was more practiced as a writer. Though I still did not have the responsibility for organizing the publication and developing its style, I had the opportunity to write and organize new material, testing my developing technical expertise and writing skills. Yet, the nature of the assignment kept me from attempting more than I could handle.

The large revision was appropriate after I had a few writing experiences. Rewriting the publication tested my technical expertise, writing skills, and ability to assume responsibility. The assignment required the kind of discipline that only comes with experience.

By then, I realized that writing involves more than pointing to a section and saying, "Hey, I wrote that."

ACKNOWLEDGEMENT

I would like to thank Mary Olsen for her cogent editorial advise as I wrote and revised this paper.

Writing Brochures and Journal Articles

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The skill and versatility of technical writers often results in their being tasked to develop promotional brochures, newsletters, and, on occasion, even newspapers. While each of these call for different production techniques, the same considerations apply that apply for technical communications.

While any printed material needs to be audience directed a promotional brochure shows most dramatically how accurately the audience has been determined. The higher the rate of dollar return for each unit of production cost, the better the need of the intended audience has been met.

Design of a brochure can enhance its effectiveness. Ideally, a brochure will be visually exciting, appropriate for its audience, and will project quality.

Words must also suit the audience. Jargon or technical terms can be used only if they are commonplace to the intended audience. The brochure also describes the goods and services available, tells why these are superior to any offered elsewhere, and how these goods and services can be obtained.

The same elements—careful choice of words, graphics, and design—enhance any printed product.

Starting a new technical newsletter is a major challenge to the foresightedness of its editor. Appearance and layout must reflect the image of the organization that it represents. The initial format cannot limit future growth of the newsletter; factors to be considered include frequency of publication, size of staff, availability of information, and overall cost per unit. Also essential prior to publication of the first issue is whether any of the material needs to be reviewed before being set into type, and, if so, by whom.

Success of a newsletter depends on its continuing to meet the changing information needs of its audience.

Above all other publications, audience interest is the key to the very existence of a newspaper. Readers will slog through the densest of technical articles to dig out nuggets of information that they feel they need, but no readers will voluntarily finish even a short newspaper article unless it is interesting.

Before getting any words on paper, the journalist must always consider who is the audience, what does this audience want to know, and how can that information best be presented concisely.

Crisp writing backed by good photographs or other graphics is the hallmark of a journalist; crisp writing with appropriate graphics should be the goal of any communicator in print media.

How to Write and Design Brochures and Direct Mail Pieces That Sell

Vilma Barr

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The objective of "How to Write and Design Brochures and Direct Mail Pieces that Sell" is to introduce the basics of creating effective sales support print pieces. Members of STC who may wish to move into the area of writing and designing sales literature, or those who have had some experience and wish to get additional ideas to improve their techniques, will find the session useful.

The material to be presented will offer practical guidelines for entry level writers and graphic artists, including:

1. *Single person communication departments*
2. *Technical writers and artists who want to broaden their skills base*
3. *Free lance writers/artists, communication consultants, eductors*

How convincing is your firm's collateral? Does it really make your firm the one the reader should select for the next outract award?

Like an actor on a stage, *a sales piece has to project!*An actor has to sell credibility in the role; collateral has to sell the firm it portrays.

Brochures and direct mail pieces sales-supportive tools. They must have a dynamic quality. They can be elegant and understated, and still be dynamic.

To make a sales piece come alive it needs a clearly defined personality. Getting some photos together, making a statement of philosophy, listing some past clients and writing some brief descriptions does not make a sales piece. It is better than nothing, certainly. But does it have a market or markets? What is its objective? What goals will it help you reach? Will it strengthen your position in the marketplace?

A brochure helps to pre-sell your firm. It establishes a level of expectation in the reader's mind. It gives a base from which to talk at interviews. It reinforces views that are shown in other formats at presentations.

How can you make your brochure dovetail with your firm's marketing goals?
What are your firm's marketing goals?
How do we make more potential clients aware that we exist and that we are able to do a top job for them or produce the products they need?
How can we control the type of work we do? How can we have particular types of clients and customers coming to us?
How do we create the right image for each client/customer group we serve?
How can we promote ourselves in a new market where we are not known?

A brochure is not going to get you where you want to go by itself, overnight. Remember that a brochure is the vehicle that communicates your product, your staff, experience and quality of work. Potential customers and clients have needs. You have solutions. They get the benefits. Tell them that, clearly and emphatically, in your brochure and in person.

Give Your Brochure Readers What They Want

What do prospective clients want your sales piece to tell them? The brochure should be:

1. honest
2. as short as possible
3. written in the language of the reader
4. interesting and stimulating
5. give usable information about the projects or products shown
6. attractive

Analysis and Planning

Work with the sales or business development people to set short and long range marketing objectives. Role play that you are your target market. Train yourself to reach the way decision makers would.

List all the design decision makers you want to read your brochure. On one side list the broad category; on the other be specific.

GENERAL CATEGORY	SPECIFIC GROUP
Developers	**of office buildings in a 100 mile radius**
Plant engineers	**of hospitals nationally**
Accountants	**A firms in a 50 mile radius**
Doctors	**eye specialists in the downtown area**

GENERAL CATEGORY	SPECIFIC GROUP
What are they interested in?	High return on investment? Wise spending of public funds? Own advancement?
What kind(s) of training do they have?	Business? Engineering? Design?
What is the general condition of their company or agency	High growth? Flat? Operating funds reduced?
What would they find unique about your firm?	Cost saving examples? In-house computer?
Who have they used previously for your type of service	Did themselves? Large national firm? Small local firm

Once you have profiled your firm's markets, profile your firm. (Or do it the other way around, if you'd prefer.) What you are really doing is developing key sales themes. Do not take for granted that the marketplace knows and loves your firm for its accomplishments. Set down what you believe you are to the outside world and then back up your statements. *Be realistic.*

APPEAL	**JUSTIFICATION**
Reliable.	tested in-house procedures. Thorough follow up to correct problems.
Experienced project management.	Specialists and technicians assigned to coordinate job details.
Full service. engineer (or architect has interior	Firm has own architect and designer and engineer, etc.
Unique capability.	Offers lower fees. Computer aided design.
Size.	Principals give personal attention to each project. Have office in Milan to handle overseas work.
Excel in planning.	Have planned 10 million square feet of office space.
Renovation experts.	Use laser technology.

Briefly, this is the information core for a brochure or sales piece. Select what is applicable.

Who you are and what you do
Your location
Your size
Your clients/customers
Projects, completed or underway, and location
Services offered
How you are organized
Key staff members
What you are selling
What it does
Why it is new or better
Benefits from its use
Cost
Specs
Where and when available

From this foundation, build a case to make you stand apart from competitors by emphasizing you strenghths and the advantages of selecting your firm to do the work. Then it is a matter of presentation ability and the chemistry generated at the interview.

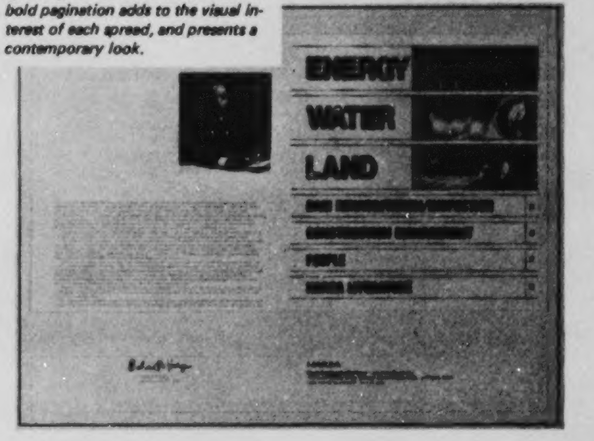
Fitting a Format to Your Firm

Do you need one brochure? A family of mini-brochures? A mini-brochure as a handout and back-up capabilities brochure for serious prospects? The answer depends on how the collateral will be used.

Here is a quick round-up of variations:

- a single pocket fol , spiral bound b & w brochure, color reprints of articles.
- a die cut brochure box, corporate brochure, and specialty brochures.
- a double pocket folder with a color/b & w bound corporate brochure, color personnel brochure, and a four page color piece.
- a bound color brochure with a flap as part of the inside back cover.
- double pocket folder contains an assortment of the firm's corporate and specialty brochures, some in color and others in b&w, and reprints.
- a die-cut window in a single pocket folder, coordinated with project sheets and other data.
- a general brochure with a separate six-side, double-fold color brochure.
- a 12-page color brochure with back flap.
- an eight-page, two color brochure.
- an eight page, color and b&w with extended back cover with flap.
- a 10'' x 10'' bound brochure printed in duotone gives added depth to illustrations of the firm's specialty.
- an 8½'' x 11'' four-page brochure than can be sent folded or flat with a visually coordinated single pocket folder.
- a 16-page, color and b&w brochure.

Harza Engineering Company is a 725-person international consulting engineering firm. It is employee-owned and financial statements are not made public. The primary marketing tool is the Annual Review which presents the company's work during the previous year. A four-color publication, it is an edition of the Harza News which has two other issues per year in a news magazine format. Areas of expertise include: hydroelectric power generation; environmental engineering; water supply; transportation; and infrastructure rehabilitation. Target audiences are: power; industrial; federal, state and municipal agencies; financial institutions; international; and the media. The 1982 Annual Review, with a die-cut textured dark blue cover, opens up to the table of contents. The bold pagination adds to the visual interest of each spread, and presents a contemporary look.



The shape the brochure takes depends on how much you want to spend on the piece (more on costs later.)

- Will the brochure be used primarily on its own, or with other specialty brochures?
- Will it be sent within a folder?
- Should there be a provision for including other pieces within the brochure such as reprints or personnel sheets?
- Will it be sent out flat or folded? What information should be visible when it is folded to fit a No. 10 size envelope?
- Will it be bound into proposals by your firm, other consultants?
- How will a covering letter be attached?

Harza is promoting dam safety for earth dams through a specialty brochure. It is used by technical and new business development personnel in the Chicago headquarters and U.S. branches. Target markets include owners and operators of small and intermediate size dams used primarily for water supply. Copy was directed to engineers, financial and management personnel and regulatory officials. The two-color format emphasizes specific copy points. Cover design is a sharp blue and white, with type reversed.

LOW COST
AUXILIARY SPILLWAYS
FOR DAM SAFETY

Some firms want a brochure that is an expanded calling card. Others want a compendium of their career's work. Flexibility allowing customizing of brochures to fit specific users or groups suits some firms quite nicely. Others want a bound brochure they can just pick off the shelf at any time.

A compact four, six, or eight page brochure that can be carried by the dozen in a briefcase is favored by some marketers to give out only a business card and follow up with a complete brochure sent in the mail. Still others like a combination of a "quicky" handout brochure followed up by another form of collateral, either a more in-depth brochure or a series of project or information sheets, bound in a folder.

The objective of the "Services for Small Hydro" brochure is to inform Harza's clients and potential clients of the firm's capabilities in the expanding small hydro market. Harza is known for its experience in the planning and design of large hydroelectric projects; this brochure establishes that, although a large firm, it does a significant amount of work on smaller projects. The target audience includes: private investors; financial organizations; power utilities; industrial users; federal, state and municipal agencies; and the media.

What To Say and How To Say It

Not only should the copy be brief, it should sound natural and effortless. So many brochures are written in "designese". People do not talk in stiff and stilted designese or "technese", but many are written that way. The best brochure copy when read aloud sounds as if someone were talking or making an oral presentation. It could be well rehearsed, but it sounds natural. *It contains punchy statements and dramatic words that evoke clear and exciting mental images to the reader.*

As creative people, we all like to put our mark on our work. If you can do it, fine; it is always admirable to begin a project hoping to invent a whole new style that puts Olivetti and John Deere to shame. *Short of this, the best technique is to be direct, believable and as forceful as the market can handle.*

The editorial style should reflect the management representatives who initiated the project in the first place, and are directly responsible for the sales effort that the print piece will support. When you interview, bring a tape recorder along. Ask the same questions a customer would. The answers are really the sales theme. Polish and refine it, but keep the essence. When management reviews a draft, and sees that you are giving back to them their own ideas and words, they may punch them up, or tone them down. Keep track of these modifications so that the tone of the piece is consistent throughout--not super low key in one part, and rat-a-tat-tat in another.

The important thing *is to listen to the people who will have to live with and talk from the print piece for several months or several years.* Their concern about a portion of the text or design is not a direct attack on your creativity, so do not take things personally. Directly or indirectly, they are reflecting their customer's/client's style or thinking. They are out there selling, so listen carefully. You should certainly defend your concepts, but be flexible. Most often, management can see further down the sales process line than you can; the smart writer/designer can still maintain the integrity of the piece, even with fairly major adjustments.

A print piece should match the selling and communications style of the resource people. If they are comfortable with it, they will use it to its best advantage.

Once you establish the scope of project, write a memo indicating who is to review the outline, drafts, layout and proofs. Any changes in this list should be added early in the process, and you should be satisfied with the rationale behind the change/addition. *Under no circumstance should your final mock-up or salt print be subjected to the scrutiny of the sales manager's brother-in-law who has an advertising-p.r. agency with a client list heavy with local restaurants and apparel boutiques.* He doesn't know your business any more than you know his. Both areas require expertise, but the approaches are vastly different.

Changes should be initiated and dated. Do not commit important decisions or requirements to memory alone. Once the piece is printed, that's it. You can't go back and erase.

Tips on Layout and Printing

Entire volumes have been written on the design and production of brochures. The following "tips" were compiled from my own experience in writing and coordinating brochures for design and technical firms, and advice from graphic art consultants.

1. **Visual Comprehension.** To test the quality of a graphic design, ask the question, "Is there an obstacle between the message and the reader?" Is the copy prosaic, the type face too small, the copy block too solid? Do the illustrations convey the message, focus attention?

Analyze the layout as if the work described and pictured were not your firm's. In other words, try to respond like a non-design trained reader. Make the graphic artist or the writer defend the copy or visual themes. If you are really at an impasse, get a few opinions and weigh the responses against your own initial gut reactions.

Ask your graphic artist to explain the grid concept to you if you are not familiar with it. A grid instills a sense of discipline and uniformity which, when combined with simplicity, makes for immediate communications.

By using design touches such as angled headlines, circles, color blocks and rules, there is enough flexibility to keep a reader's curiosity alive, all within a controlled modular system. If you think the layout looks too stiff and wire drawn, ask the designer what can be done to liven it up.

Every rule can be broken, but not in excess. Gimmicks used for the sake of being different, however, do not usually come off. Instead, they distract, calling attention to themselves rather than augmenting the message. There is a fine line between a gimmick and a creative variation. Trust yourself to recognize it when you see it.

1. **Copy and Type.** Use subheads, bullets, dingbats and other graphic techniques to break up copy and make it more readable. (A dingbat is a typographical ornament or symbol.)

Graphic designers believe that both serif and sans serif type faces can be used to give either a traditional or contemporary look. (A serif is: "any of the short lines stemming from and at an angle to the upper and lower ends of the strokes of a letter." "Sans serif" or without serifs lacks these extensions.)

3. **Proofing and Printing.** Have your graphic designer go over the highlights of the preparation, proofing and printing process. Proofing and review for four color has more steps than for one or two color printing jobs.

At every step of the way where copy is involved--galleys, paste up, proofs--have the copy read aloud. It is a good idea to have two other people who have not seen the text proof it. If you have written it yourself, or have read it before, your eye tends to skip over the words and you do not pick up on misspellings or typos. Read everything: headlines, captions, subheads, punctuation marks, capital letters, phone numbers. There is nothing more agonizing than an error that jumps off the final printed page.

If at all possible, check the press proof for work of two or more colors. It is expensive to make changes at this point, but sometimes you can catch an error that slipped by at earlier proofing stages.

4. Illustrations and Photos. The larger the image, the stronger statement you are making with it.

Use posterization or line conversions for photos when the original image is not sharp, or you want to make another statement beyond the photo. The most popular forms of line conversions are:

a. Tone conversions. The grays drop out and the image becomes black and white, or any other single color.
b. Mezzotint. A screen of dots is placed over the photo. The dots range from fine to coarse.
c. Bar screen. Screens consisting of vertical, horizontal, circular or wavy lines break up the realistic image of the photo.

COSTS

There are no hard and fast rules relating to how much you should pay for a brochure. If you are a six-person firm and can afford a 16-page, all-color piece that will cost $10 to $12 per copy because it makes good marketing sense in your analysis, that is what you should consider. If a 200-person firm wants a one-color four-page brochure that cannot cost more than $1.50 per copy, this constraint should be plugged in early.

Construction Management Services
HARZA

A 12-page color brochure, "Construction Management Services," describes Harza Engineering Company's worldwide experience in all phases of construction planning, estimating and scheduling and inspection. The copy theme, "Harza's CM professionals understand both design and construction; the project moves into the construction phase without built-in problems," was set by the vice president and department head. Cover design is a montage of color views shown inside, printed on a screened grey ground.

The bigger the run, the lower the cost per piece. Small runs are expensive for the product received because the printer's set up charges have to be absorbed by fewer pieces.

Depending on the market, the brochure can last from 12-48 months. To take advantage of printing economies, order sufficient initial quantity so you will not run out in six months. Do not be careless about distribution, but do not be stingy either.

If you want to do a speculative mailing, do not send out a $5 brochure to 2,000 names from a rented mail list. Instead, get a simple companion direct mail piece and respond to qualified leads with the $5 brochure.

Should you print full four or five-color, one-color or two-colors? It really depends on the subject matter. If there is sufficient dimension in the product so that the lack of color does not significantly diminish the desired impact, b&w can be effectively used. No doubt about it, four-color commands attention. However, four color in some cases can be an overkill. An infrastructure brochure would be garish in four color. Cracked sewer lines and crumbling concrete call for help just as loudly in b&w.

Costs for printing vary regionally. Printers bid each job separately, depending on the number of photos and illustrations to be stripped in, and other technical factors. Most printers will not guarantee a price for more than 30 days from the date of the bid.

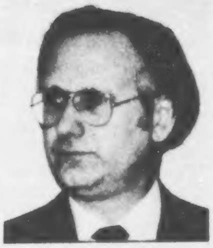
Make sure you get good advice on paper stock. It contributes to the overall look and mood of the piece as much as the type style and layout. The best way to narrow your choices is to do research on printed pieces you admire, and then ask your artist or printer if the stock that appeals to you will work with what you want your brochure to achieve.

TRACK THE RESULTS

Once the print piece is out on the street, find out if it is meeting its objective. Live leads? Orders? More RFPs? Some large firms may already have a follow-up response system in place. For smaller firms, develop with the sales or marketing manage a quick tally sheet. You can then determine if you do indeed have a model to follow for future print pieces, or whether the lessons learned will give you and your resource people new insight into capturing a bigger share of the marketplace in the future.

Birth of the Blue

Kurt H. Miska



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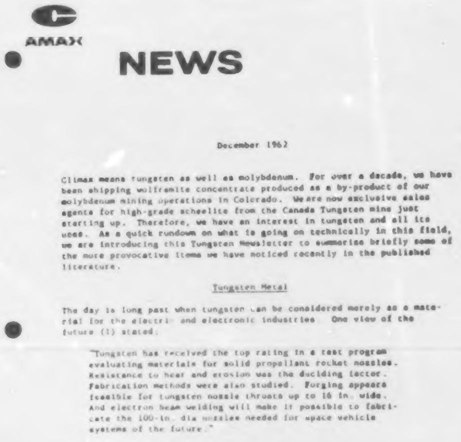
Strong technical information programs have always been a vital part of market development at Climax Molybdenum and AMAX Tungsten. This paper briefly recalls the history of the Tungsten News and how it led to the more marketing-oriented newsletter Tungsten Today. The conception, execution, distribution and future of this periodical are described.

When I joined the Technical Information Department of the Climax Molybdenum Company, a division of AMAX Inc., in June 1978, I was appointed editor of the Tungsten News. Published continually since 1963 (Fig. 1), this venerable and somewhat esoteric periodical was, for all practical purposes, an annotated bibliography. Generally appearing quarterly, it contained no articles as such, just telegraphic notes on developments in all phases of tungsten technology. To those outside of the tungsten industry it must have been the epitome of dullness.

Since I was given free reign to improve the publication, I gradually changed its format and general appearance. By late 1979 I had changed the masthead. This coincided with the announcement that the new AMAX Tungsten Division had been formed. By the Spring of 1981, the first cover photograph appeared on the Tungsten News (Fig. 2). That was quite a milestone.

Business for the infant division was quite good, and while the Tungsten News served admirably to disseminate news about technical developments in tungsten to the academic and industrial communities, a more marketing-oriented publication was needed to stimulate tungsten sales. Case histories of interesting uses of tungsten, tungsten-containing alloys and tungsten chemicals were to be the main focus of the new publication, which was to appear quarterly, and alternating with the Tungsten News.



AMAX

NEWS

December 1962

Climax means tungsten as well as molybdenum. For over a decade, we have been shipping wolframite concentrate produced as a by-product of our molybdenum mining operations in Colorado. We are now exclusive sales agents for high-grade scheelite from the Canada Tungsten mine just starting up. Therefore, we have an interest in tungsten and all its uses. As a quick rundown on what is going on technically in this field, we are introducing this Tungsten Newsletter to summarize briefly some of the more provocative items we have noticed recently in the published literature.

Tungsten Metal

The day is long past when tungsten can be considered merely as a material for the electric and electronic industries. One view of the future (1) stated:

> "Tungsten has received the top rating in a test program evaluating materials for solid propellant rocket nozzles. Resistance to heat and erosion was the deciding factor. Fabrication methods were also studied. Forging appears feasible for tungsten nozzle throats up to 16 in. wide. And electron beam welding will make it possible to fabricate the 100-in. dia nozzles needed for space vehicle systems of the future."

1. Partial front page of the first issue of Tungsten News.

Tungsten News

AMAX

SPRING 1981

Vol. 19, No. 2

2. The first issue of Tungsten News featuring a cover photograph.

Proposal for a New Publication

I proposed several ideas very informally, but many months passed before the subject surfaced again. Despite the division's desire to have another periodical, there always seemed to be other more pressing business, and my requests to act on the new publication were frequently met with "let's talk about it soon" comments. One suggestion made by the new division was to combine the Tungsten News with the still-to-be-born marketing-oriented publication. While most of my ideas were received quite favorably, the key people in the Tungsten Division continued to procrastinate. Nevertheless while waiting we did decide that it would not be in the best interests of the division to combine the two different publications.

Finally, in late March 1981, I was told to proceed. Now it was up to me. I had no in-house graphic services, but, having already worked with numerous outside suppliers, I knew who I would use to develop this new periodical. Also, my department head gave me carte blanche, and I was equally fortunate to have a more than adequate budget for the task. Starting with a blank page is extremely challenging and slightly intimidating.

I had some well defined ideas of what I wanted. I knew I wanted the following:

- Three column format
- Two color
- 8-1/2 x 11-in. size
- Sans serif type
- Four pages with the capability of being expanded to six
- Use of the capital letter W as a design element in the masthead
- Not to be a self-mailer

Why way I so specific? Personal preference and past success with other newsletters using basically similar approaches were just two reasons. More specific reasons were:

- Three-column format--very flexible layout, easy to read, past success.
- Two color--adds a touch of professionalism and catches the readers' attention; a rich blue (PMS 293) was selected because it is the color of the chemical compound tungstic blue oxide.

- 8-1/2 x 11-in. size--this is a standard size that makes use of equally standard 17 x 11-in. paper. Also easy to expand to six pages when required.
- Sans serif type--a purely personal preference despite the better readability of serif type
- Use of W on masthead; W is the chemical symbol for tungsten.
- Not to be a self-mailer. There is less potential for damage during mailing since the newsletter has to be placed into an envelope.

The Start

My choice for production of the premier issue of Tungsten Today was Communication Corporation of Stamford, CT, a full-service printer with a graphic design staff. I had already established an exceptionally good rapport with this company, and our initial discussions about the infant newsletter came off extremely well. The designer was given free reign to work within my recommendations. I was the only person who saw the initial four designs. Some modifications were in order, and before long my printer and I were ready to show more definitive designs to key people in the tungsten division.

We made a highly informal presentation to the tungsten people who did not, by their own collective admissions, know much about the graphic design process. It lasted all of ten minutes to the best of my recollection and was followed by painful silence. Finally, the market development manager noted, "You're not going to make it that small are you?" We had shown them 5 x 8-in. designs, forgetting our audience's lack of understanding of the graphic design process. We pointed out that the finished product would most certainly be 8-1/2 x 11 in. Without much further discussion all agreed that the basic design was acceptable. Right then it was also decided that the name of the new publication would be Tungsten Today.

The printer and I worked to refine the design, and we agreed on the following typefaces and column widths.

- Body copy   10/11 point Helvetica light, flush left and right, 15 picas wide
- Heads 18 point, Helvetica medium (Roman and Italic)
- Subheads 10/11 point Helvetica medium, flush left
- Captions 9/10 point Helvetica light.
- Credits 6 point Helvetica light
- Asterisk copy 8/8 point Helvetica light

I also continued to work on the editorial content. Three articles and a short editorial were planned for the premier issue. These were suggested by the market development manager and myself. We were very determined to create a diversified issue containing articles on several different aspects of tungsten technology. The idea was, of course, to appeal to as many potential readers as possible. I wrote two of the articles, and a metallurgical consultant with considerable editorial experience tackled the third one. I chose to use consultant services because my many other technical information duties prevented me from spending as much time on this project as I might have liked. Fortunately we had acquired word processing capability by then.

Review was next. Technical Information and the various AMAX divisions have no established formal review procedures but my own experience has taught me that careful review is a must. The possible negative consequences are not worth the time that might be saved, if this process is compromised. Two of the three articles were also submitted to the companies whose technology and developments we had covered, and we gave them approximately two weeks to comment on the articles. I also pointed out that if I did not hear from them in that time, I would assume that the articles met with their approval. This approach has rarely ever failed me in my many years as an editor and writer.

Corporate review involved the divisional president, vice president and market development manager. Informal review at these levels was nothing new, this procedure having been followed regularly for the Tungsten News. As always, I stressed the deadline for completion of review and, even though this was not entirely adhered to, the process was completed reasonably on time. When I had my signed-off review copies and all corrections and comments were incorporated, I turned all material over to Communication Corporation.

More Review

Less than two weeks later, I received the design prototype with all material in place. I was very pleased with what we had accomplished but I still had to show it to the Tungsten Division for further approval. Even though they had approved my copy, I had a premonition that all would not go without incident. I was right. The ever cautious market development manager made more changes, changes that he felt would remove any possible vestige of uncertainty about the position of AMAX Tungsten in the marketplace. I could not really argue with him although I pointed out to him that his extreme caution would cause additional delays in production of the newsletter. Nevertheless I had to accept his changes but I stopped him when they concerned my writing style and the graphic presentation.

However, the Tungsten Division did like the design, layout, and overall look of the new newsletter. My ever patient designer made the requested changes. We also decided to tip in a prepaid postcard to solicit reader comments and to determine if readers wished to continue receiving Tungsten Today.

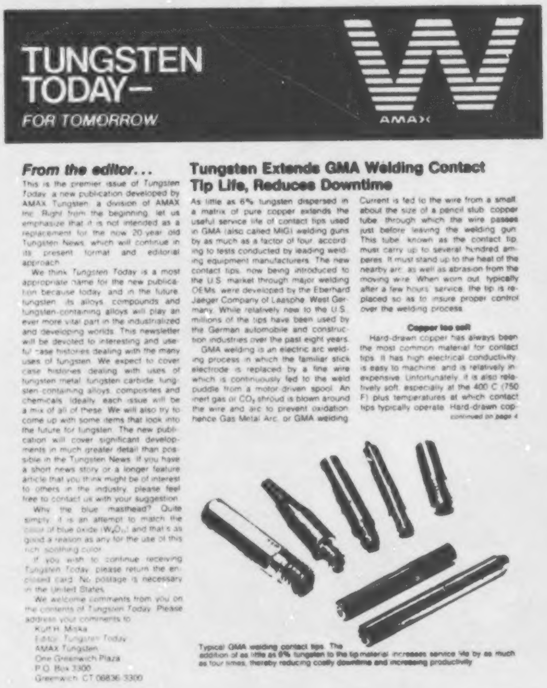
Start the Presses

In short order I received the blueprint (silverprint) and with the exception of some minor corrections we were ready to go on press. The run was to be 6,000 copies. Being the thorough and conscioustious printer that he is, he sent me a second blueprint to show that all corrections had been made. At that point it certainly looked as if the time had finally arrived and the presses could start to roll.

However, when I was checking the second blueprint, the market development manager happened to stop by my office. Even though I did not volunteer to show him this second blueprint, he prevailed on me to do so. That was a momentary setback. He read my editorial and, believe it or not, suggested yet another change. I did not believe my own ears. I called Communication Corporation and, with the him present, asked what it would cost in time and money to make this last change. There was audible disbelief, and I was told that to change the six disputed lines would cost about $25 per line and at least two more days of delay. Reluctantly my visitor relented, and we went to press.

On Press

For me it was a day of rest while the premier edition of Tungsten Today was on press. It does not take very long to run and fold 6,000 copies of a two-color newsletter, and in a few days my printer called me to say that he was on the way with copies (Fig. 3). We celebrated over lunch and I could not have been more pleased. After lunch I delivered copies to my department head and the tungsten division. The lengthy gestation from early 1981 to February 1982 was worth it because everyone liked it. In some ways it was anticlimactic for me since I had lived with the project for so long. I do not mean to imply that I was displeased in any way, but I really wanted to start on the second


TUNGSTEN TODAY—
FOR TOMORROW

AMAX

From the editor...

This is the premier issue of Tungsten Today, a new publication developed by AMAX Tungsten, a division of AMAX Inc. Right from the beginning, let us emphasize that it is not intended as a replacement for the now 20-year old Tungsten News, which will continue in its present format and editorial approach.

We think Tungsten Today is a most appropriate name for the new publication because today, and in the future, tungsten, its alloys, compounds and tungsten-containing alloys will play an ever more vital part in the industrialized and developing worlds. This newsletter will be devoted to interesting and useful case histories dealing with the many uses of tungsten. We expect to cover case histories dealing with uses of tungsten metal, tungsten carbide, tungsten-containing alloys, composites and chemicals. Ideally, each issue will be a mix of all of these. We will also try to come up with some items that look into the future for tungsten. The new publication will cover significant developments in much greater detail than possible in the Tungsten News. If you have a short news story or a longer feature article that you think might be of interest to others in the industry, please feel free to contact us with your suggestion.

Why the blue masthead? Quite simply, it is an attempt to match the color of blue oxide (W_4O_{11}) and that's as good a reason as any for the use of this rich, soothing color.

If you wish to continue receiving Tungsten Today, please return the enclosed card. No postage is necessary in the United States.

We welcome comments from you on the contents of Tungsten Today. Please address your comments to:

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P.O. Box 3300
Greenwich, CT 06836-3300

Tungsten Extends GMA Welding Contact Tip Life, Reduces Downtime

As little as 6% tungsten dispersed in a matrix of pure copper extends the useful service life of contact tips used in GMA (also called MIG) welding guns by as much as a factor of four, according to tests conducted by leading welding equipment manufacturers. The new contact tips, now being introduced to the U.S. market through major welding OEMs, were developed by the Eberhard Jaeger Company of Laasphe, West Germany. While relatively new to the U.S., millions of the tips have been used by the German automobile and construction industries over the past eight years.

GMA welding is an electric arc welding process in which the familiar stick electrode is replaced by a fine wire which is continuously fed to the weld puddle from a motor-driven spool. An inert gas or CO_2 shroud is blown around the wire and arc to prevent oxidation, hence Gas Metal Arc, or GMA welding. Current is fed to the wire from a small, about the size of a pencil stub, copper tube, through which the wire passes just before leaving the welding gun. This tube, known as the contact tip, must carry up to several hundred amperes. It must stand up to the heat of the nearby arc, as well as abrasion from the moving wire. When worn out, typically after a few hours' service, the tip is replaced so as to insure proper control over the welding process.

Copper too soft

Hard-drawn copper has always been the most common material for contact tips. It has high electrical conductivity, is easy to machine, and is relatively inexpensive. Unfortunately, it is also relatively soft, especially at the 400 C (750 F) plus temperatures at which contact tips typically operate. Hard-drawn cop-

continued on page 4

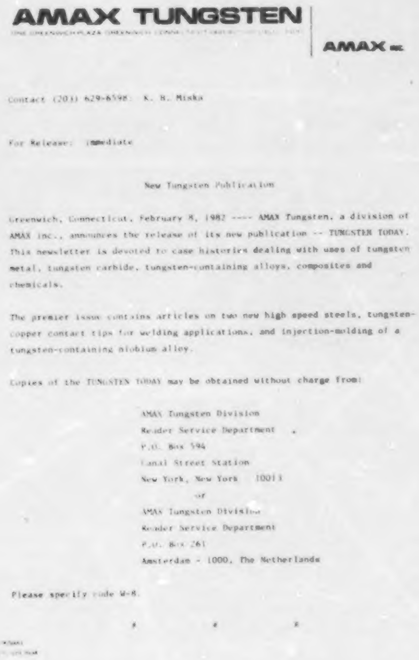
Typical GMA welding contact tips. The addition of as little as 6% tungsten to the tip material increases service life by as much as four times, thereby reducing costly downtime and increasing productivity.

3. Premier issue of Tungsten Today.

issue. Suffice it to say that second issue took only three months from start to finish.

Epilogue

Several items still remained on the agenda. I instructed our public relations agency in Hartford, CT to issue a news release (Fig. 4) announcing the availability of this new AMAX publication. Our mailing houses in New York, NY and Amsterdam, The Netherlands were instructed to use the Tungsten News mailing list for distribution of the premier issue. An internal distribution to key executives, supervisors and managers was also initiated.



AMAX TUNGSTEN

AMAX INC.

Contact (203) 629-6598: K. H. Miska

For Release: Immediate

New Tungsten Publication

Greenwich, Connecticut, February 8, 1982 ---- AMAX Tungsten, a division of AMAX Inc., announces the release of its new publication -- TUNGSTEN TODAY. This newsletter is devoted to case histories dealing with uses of tungsten metal, tungsten carbide, tungsten-containing alloys, composites and chemicals.

The premier issue contains articles on two new high speed steels, tungsten-copper contact tips for welding applications, and injection-molding of a tungsten-containing niobium alloy.

Copies of the TUNGSTEN TODAY may be obtained without charge from:

AMAX Tungsten Division
Reader Service Department
P.O. Box 594
Canal Street Station
New York, New York 10013
or
AMAX Tungsten Division
Reader Service Department
P.O. Box 261
Amsterdam - 1000, The Netherlands

Please specify code W-8.

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4. Press release announcing the new periodical.

In retrospect it is also very interesting to review the costs incurred in the design and development of Tungsten Today. All the work that went into the premier issue was not really expensive. Design, development and printing of 6,000 copies, including the tipped-in postcard, came to $6,583.00 or $1.09 per copy. When the technical information function was transferred to our Ann Arbor, MI offices, I turned this work over to a local vendor, and increased the print run to 7,500 copies Cost per copy came down to $0.33. These prices include postage, but it does not take much calculating to appreciate that mailing this newsletter first class mail is quite expensive. Obviously, this increases the cost of a single issue considerably.

Our original estimate of a print run of 6,000 copies was off the mark because by the end of 1982 we had exhausted all supplies of the issue. Tungsten Today had proved far more popular than anyone had anticipated. Fortunately, Communication Corporation still had the negatives and was able to print an additional 1,500 copies.

The premier issue took over one year to produce. Subsequent issues took much less time, but it still amazes me just how long it takes for a single issue to be written and produced. The average seems to be three to four months.

Despite the success of Tungsten Today, the single biggest problem continues to be obtaining enough good leads to develop into interesting articles. I constantly search for such leads, as are the two consultants on the staff of Technical Information Department. The problem is also one of obtaining non-proprietary, newsworthy information; most companies carefully guard much of what would be interesting to publish. Often what seems to be a good lead or idea to me is vetoed by the tungsten division for a variety of reasons. The tungsten business is very sensitive when it comes to the written word.

Regretably, the original goal of producing Tungsten Today on a quarterly basis was not realized. Three issues were published in 1982 and at time of writing this paper in 1983, three more were published. In part, this can be attributed to the fact that I am also editor of the Tungsten News, as well as three periodicals devoted to various aspects of molybdenum technology.

Postscript

When I was doing the final editing of this paper, the tungsten market had not yet recovered sufficiently from the 1982/1983 recession, and the technical information budget for tungsten continued to be the subject of very close scrutiny. There was much discussion about the effectiveness of the venerable Tungsten News and whether or not we could continue to support this periodical. Even though it had been published continuously for 21 years, that was no guarantee of automatic survival. In that respect business is not very sentimental. The solution, in the collective minds of AMAX Tungsten, is to combine the two publications into a single 8-page, typeset newsletter that retains the best features of both publications. The new newsletter will preserve the name Tungsten News and some of the features of the old Tungsten News. In addition, the new publication will retain the major masthead elements of the short-lived Tungsten Today along with the already successful case history approach.

A Different Way of Writing, a Different Way of Seeing: Making the Transition from Technical Writer to Journalist*

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As a technical writer or editor, you occasionally may need to add the role of "journalist" to your repertoire. When you're faced with writing and taking photographs for your company's in-house magazine or writing a press release, remember that you can ease the translation from technical communicator to journalist. Whether the medium is visual or verbal, your role technical or journalistic, you can begin by asking yourself three familiar, and basic, questions:

Who is the audience?
What is your message?
How can you best say it?

As you put your answers to practice, you'll find you can apply the communication skills and knowledge you already possess to learn a different way of writing and a different way of seeing.

While listening to others "sound the future" for the field of technical writing, I have heard some say that technical writers and editors are in danger of being replaced by spelling and editing software packages on word-processing systems and by scientists eager, willing and able to write their own documentation. My own view is that—instead of a shrinking part to play—technical writer/editors who understand technology and can explain it in clear, simple language will have a growing number of roles to explore.

One role is that of the journalist.

This role has also changed since the days when "journalists" were mainly newspaper reporters churning out terse, factual news stories. Journalists are now found taking photographs and writing general and sometimes semi-technical articles for companies and organizations as part of "Internal Communications" groups, "Public Relations" groups and so on.

You may someday find yourself writing a news release about your company's latest technical breakthrough or taking photos and composing a feature article for your company's newspaper. In these situations, it helps to realize that you can apply the skills and tools you already have as a technical writer/editor to journalism.

Whether you're faced with composing words or images, begin by carefully considering three basic questions that apply to all fields of communication, not just technical writing, journalism or photojournalism:

Who is your audience?
What is your message?
How can you best say it?

WHO IS YOUR AUDIENCE?

> *Who is this elusive creature?...a person with an attention span of about twenty seconds...assailed on every side by forces competing for his time: by newspapers and magazines, by television and radio and stereo...* William Zinsser(1)
> *They have been exposed to continual visual communication, many of them since early childhood. They are conditioned to look first, and read second....They are visually sophisticated, sensitive to nuance and symbol.* Phil N. Douglis(2)

As a journalist, you need to look at what makes your audience different from a technical audience.

As a technical communicator, you usually presume that your audience has some expertise in a given technical field or that they have some basic scientific or technical training. In addition, that audience is *motivated* to read what you write. For example, when faced with a manual and the hardware, the user can either read the documentation or poke and prod until the system works. Most users will try, with varying degrees of patience and success, to read the instructions.

When you play journalist, the view is different. Your audience may be everyone in your company or the general public. They have a variety of educational levels and backgrounds, and they don't *have* to read or look at anything you create. In addition, your readers have short attention spans, are visually literate, and want to be "entertained" while they are being informed. So, using the written word, the visual image or both, you want to "hook" your audience into reading your article before consigning it to the circular file.

WHAT IS YOUR MESSAGE?

> *People look at pictures today because they expect to find expressive content in them.... For a still photograph to draw [their] interest, it must do much more than just sit there. It must call attention, say something to them, and say it well. It must communicate.* Phil N. Douglis(2)
> *To be informative is not enough; the information must be presented in ways that strike home, with a direct bearing on the reader.* Rene J. Cappon(3)

Knowing the subject or content of your article or photo is having only part of the answer to this question. You must also decide on a message or "angle." In other words, you know the *what* and *who*...now what about the *why* and *how*? As Phil Douglis notes: "Never take a picture of a person, place or thing without trying to make it come to life and say something about itself. When you've seen a picture of someone's building, machine, or oil well, you've seen 'em all."(2) And once you've read an article about a service award, new facility or new computer system, you've read them all. Every subject has many angles (both visually and verbally!). Ask yourself: What are you trying to tell them that's different? That your company's new building is the third architectural wonder of the world? That the new word-processing package has seven amazing features?

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*Work performed under the auspices of the U.S. Department of Energy by the UCLLNL under contract number W-7405-ENG-48.

Photographs are especially vulnerable to being published with no thought given to their content and message. Remember that your readers are visually literate. They've been raised on television and movies, and they expect images with content. Always ask yourself: What is this photograph saying to me? Photos are often published for reasons other than to communicate(2):

Recognition: Many photos are printed to give someone recognition. This is usually the only purpose for the typical photos of awards, ribbon-cutting ceremonies, and "grip and grin" poses.

Decoration: Some photos are printed for graphics reasons alone. This includes strangely cropped and shaped photos and photographs printed simply to break up a page that is a gray sea of text.

Illustration: Many photos are printed just to show what something looks like. For a technical report, this is probably fine. If you are talking about details on a meter, you would want to show what the meter looks like! However, photographs like these are not photojournalistic unless you are telling about more than general appearance.

HOW CAN YOU BEST SAY IT?

> *Writing is the art of second thought. What first springs to mind is seldom good enough... By good enough I mean copy that's clear, precise, succinct and expressive.* Rene J. Cappon(3)
> *What reinforces the content of a photograph is the sense of rhythm, the relationship betwen shapes and values. To quote Victor Hugo: "Form is the essence brought to the surface."* Henri Cartier-Bresson(4)

Once you have a message, you want to say it in the best and clearest way. You also want both your words and your images to contribute to and reinforce your message. For instance, if your words extoll the virtues of your new office building, don't run a photo that makes it look like a dungeon. Your article should deliver a coherent message.

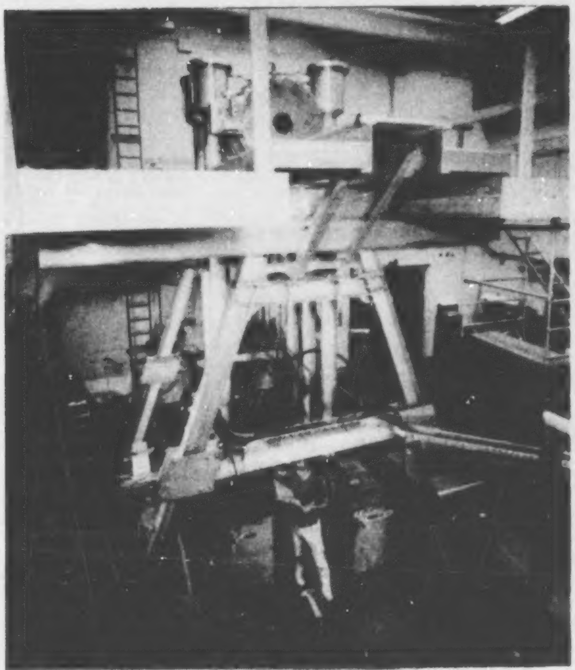

Figure 1. What's the point of this photo? Are we supposed to be looking at the system or at the person below? The general clutter and lack of a focus point add up to make the photographer's message unclear.

But will your audience listen to your message? How can you "hook" your readers into staying around long enough to get your point? The key point is to BE INTERESTING. The following four principles can help you deliver your message in an interesting and postive way.

Keep it clear and simple

It's easy to get mired in convoluted words and images if you aren't clear about your message or if you try to say it all at once.

The drive to say it "all at once" is especially strong when writing the "lead" or introduction of an article. When I first struggled with writing leads, I figured that the "who-what-where-when-why-and-how" should all go in the first sentence. I discovered that this approach wasn't in the best interests of clarity. For example, try this lead:

> The United States and the other Western nations with forces in Lebanon have turned down an urgent Lebanese Government request that they enter the disputed Shuf area around Beirut and try to halt the growing civil strife there, according to Secretary of State; George P. Shultz and other Administration officials.(5)

The information may be there, but it's a struggle to find it. Strunk and White advise: "Clarity, clarity, clarity. When you become hopelessly mired in a sentence, it is best to start fresh; do not try to fight your way through against the terrible odds of syntax."(6) Compare the previous lead to the following written by AP's John Barbour: "Man landed on the moon, this day, Sunday, July 20, 1969."(3)

Clarity in photos is as important as in sentences. Compose your image so there is no doubt as to what you want the readers to focus on. (Figures 1 and 2)

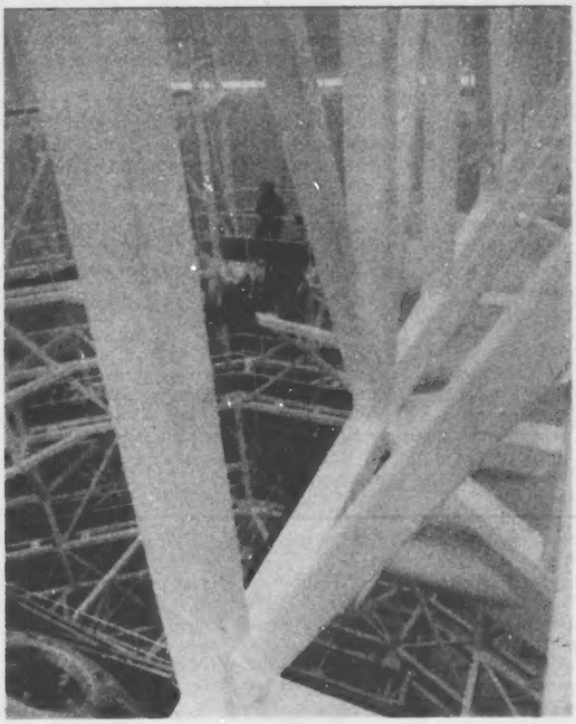

Figure 2. When you frame your photograph deliberately, you draw the viewer's eye to the point of interest. The lines in this photo convey the complexity of the structure in a pleasing and rhythmic manner.

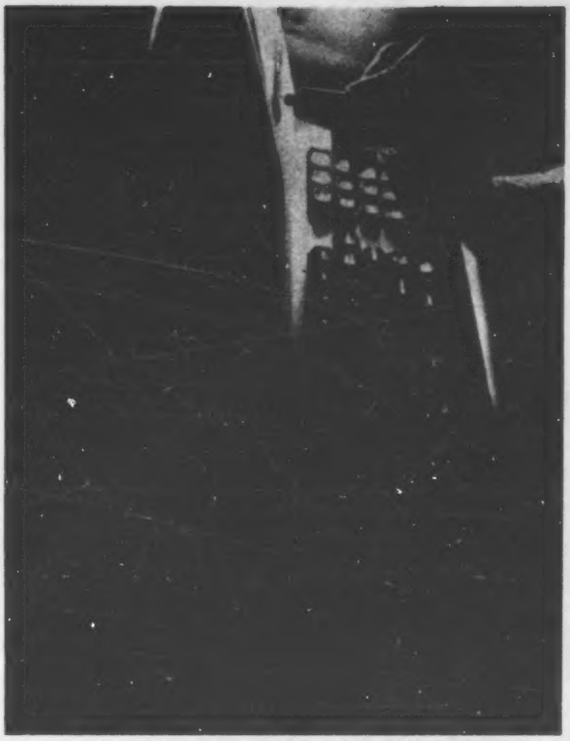

Figure 3. For an article on computer-aided design and engineering, everything extraneous is pared away to make a very simple photograph from a strong vantage point. By moving in close, the photographer emphasizes the keyboard, the hand, and the lightpen.

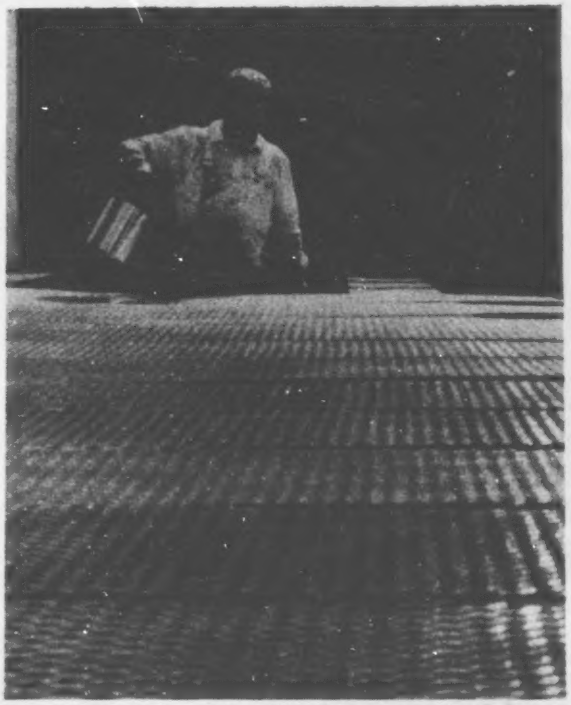

Figure 4. The angle and the lighting help create and emphasize the relationship between the painter and the catwalk.

Look for relationships

If you must write about general problems or products, relate them to individuals. People love to read about other people. *The Wall Street Journal* has good examples of tying "big" issues to individuals. For instance, an article about compulsory overtime begins:

> Virgil Archer doesn't try to talk with his fellow workers. He is afraid it will start a fight.
> 'It's best to mind your own business in the plant," he says. "It's a rough place. People tend to stay to themselves."
> The 42-year-old Mr. Archer doesn't work in a prison workshop, although he says his seven-day week "is like going to prison." He works in Chrysler Corp.'s auto plant in the Cleveland suburb of Twinsburg. Workers there have been working so much overtime that they explode over trifles at foremen, fellow workers, wives and even their dogs.(7)

When you look for relationships in photographs, focus on visual incongruities and tensions. Make an effort to really *see* what you are framing in your viewfinder. You can use lighting and your shooting angle to bring out the relationships you want to emphasize. (Figures 3 and 4)

Add humor

Humor is the unexpected: an incongruous word or image; an unusual turn of phrase or visual relationship. Humor takes readers by surprise and says: "Look again!" A light touch of humor helps to lead the reader into this article about investment tactics in 1983:

> Money managers live by convincing investors of a simple premise: That some wizards can beat the market by picking the right stocks before the chumps do. But last year, the money managers looked like the chumps.(8)

In photographs, humor also works to grab the readers' attention. Look for the unexpected in detail and how people relate to each other and their environment. Look for contrasts and the tensions. (Figure 5)

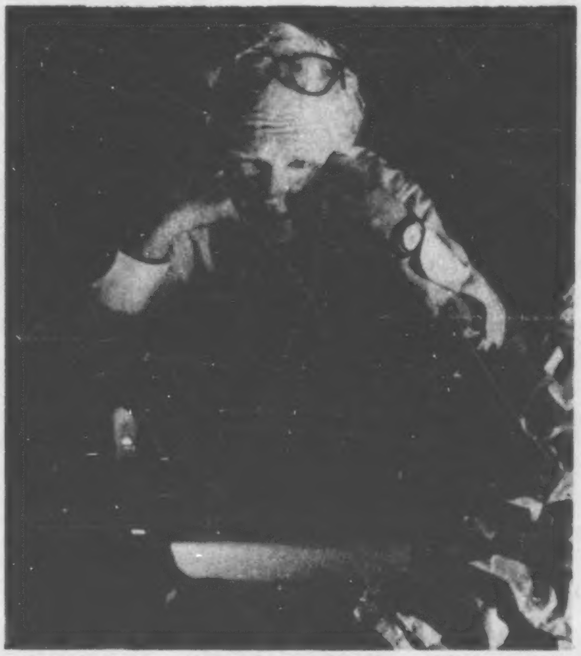

Figure 5. This humorous image was part of an article about word-processing systems. The writer's expression, disheveled appearance, and the masses of crumpled paper tell a story that draws the viewer into the photo and the article.

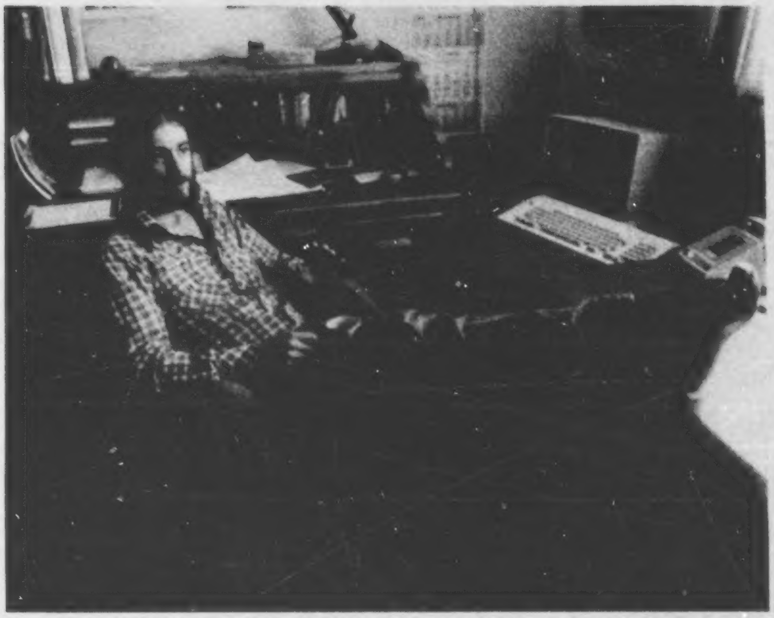

Figure 6. When looking for the "active voice" in photographs, watch people's expressions and posture, and watch the framing of your photo. Details supply clues as to the nature of your subject.

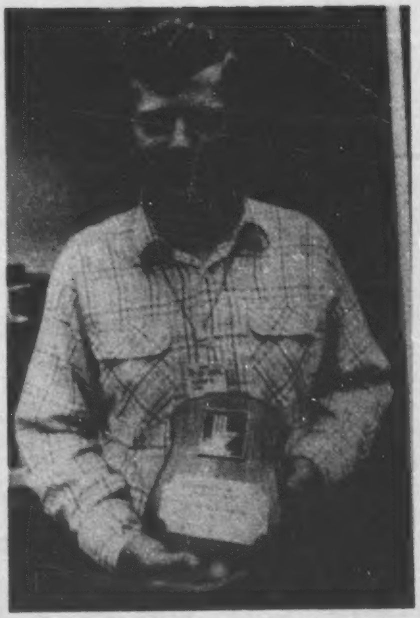

Figure 7. The "passive voice" in photographs or writing can obscure your message and put your viewers to sleep. Posed, literal images tell very little about the person being photographed.

Use an active, vivid voice

In words and images, use the active voice. Be specific and succinct; select details that readers can see. Use vivid verbs to paint pictures with your words, as in this lead:

> The soldiers banged like the devil on the bishop's door. The splintering of the latch woke him from dreams of his suffering Christian flock, scattered west to the Cordillera range and east to the Sierra Madre.(9)

Words like "banged," "splintering" and "scattered" are active, vivid words which help bring this lead to life.

In photographs as well as sentences, avoid the "passive voice." The standard award shot or group shot does nothing more than tell you what the award winner or group looks like. Think of your message and your perspective. Most photographs are taken 3-6 feet away from the subject at shoulder height. A different angle will emphasize something different about your subject. Watch people's expressions, actions and interactions. Strive to make your visual point as strong as you can! (Figures 6 and 7)

FINALLY...

Remember that, as a technical editor or writer, you already have the basic tools and skills you need. You know the basic rules of grammar, the basic questions to ask, and how to research and organize your information. For photography, you can use many of the writing principles and skills you already have and translate them to a different language: the language of imagery. Making the jump from technical communication to journalism is mostly a matter of practice. You learn to write by writing; you learn to photograph by taking photographs. It's the process of learning a different way of writing and a different way of seeing.

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Controlling Language in Structured Layouts

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Students of technical communication who are learning to write manuals for computer users need to develop special controls to ensure that their language is accessible to increasingly non-technical audiences.

Techniques such as "Logic Trees" and "Information Mapping" help writers of user manuals to lay out tutorials and instructions. With these techniques, writers and students now have useful guides for finding suitable formats and for disposing the content into appropriate parts of manuals. But efforts to help student writers choose effective styles of language for software manuals have been less successful. Beginning writers need to discover a method that will facilitate their fluency and at the same time help them discipline their writing.

Varieties of "Controlled" English developed by numerous international corporations are useful for writers of computer user manuals because they make it possible to follow one clear reader-orented goal:

- Write simply and clearly so that all readers will find the text easy to understand.

Guidelines such as these prescriptions of "Controlled" English are useful for writers of computer documentation:

- Select specific and concrete words. Prefer words and phrases at the lowest level of abstraction and generalization.

  Example: Prefer "How to Operate this System" to "Overview"
  Prefer "What this Program Does" to "Background"

- Use Command Forms. To explain operations, prefer the imperative to the simple declarative.

  Example: Prefer "Press ENTER" to "You need to press ENTER."

Applied to the writing of user manuals, the prescriptions of "Controlled" English actually help to guide writers when they select words and phrases. This style suits the needs of a wide variety of users because it avoids the Scylla of incomprehensible technical jargon and the Charybdis of patronizing or unctuous language.

Task Analysis (Need to Know: The Way to Go)

Gem Mitchell, Moderator

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How do you know what information to provide to your users? How do you organize and present the information you develop so that it is easy to use? Is there any method, any technique that can help you find a way to approach these most basic problems of technical communication?

In 1980 an IBM corporate wide task force designed a guideline that introduced a new concept to technical communication—the concept of task analysis. Task analysis is a process of inquiry and reevaluation used to define discrete jobs or actions. Applied to technical communication, task analysis means that writers must understand how our customers will use a product and provide only the information needed by the customers to get the job done. The customer now receives libraries (sets of manuals that support a product) designed according to a task structure rather than to product description.

This overview describes a panel, workshop, and mixed-media poster exhibit explaining task analysis.

The Panel
Need to Know: The Way to Go— Studies in Task Analysis

The papers presented in this panel explain the basic concepts of **task-oriented library design.** Two themes of task-oriented library design are described.

- **Information definition**—Using task analysis to plan, outline, write, and test each manual.
- **Information presentation**—Using task analysis to present the information to the customer in an useful way.

Session I: Information Definition

A Task Analysis Primer for Technical Communication

In his paper Robert Ward presents a six-step method for developing a task analysis. He explains how to use the results to design, develop, and test an easy-to-use information package. He concludes by generalizing the applicability of task analysis to other fields.

Task Analysis: Contributions to Usability

In her paper Candace Soderston explains how holding a "task analysis meeting" early in the development cycle allows you to determine the scope, define the audience, and establish the objectives for a new customer library.

Case Study in Task Analysis Use

And in her paper Eleanor Wight explains how the task analysis approach was used to develop the information for a specific manual.

Session II: Information Presentation

To Print or Not to Print: Choosing Alternative Media

Rosemary Pugliese tells us about the relationship of task to the type of media used to present the task. Her paper recommends a thoughtful approach to making the important decision of how to package what you write.

Case Study: Two Forms of Task-Oriented Information

Jarey Lee Cortright explains how she resolved the form-function conflict with respect to a specific product. That there were two different user groups for the same information required that information be presented in very different formats.

The Workshop
Need to Know: The Way to Go— Experiences in Task Analysis

Jarey Lee Cortright's task analysis workshop is a two-hour forum. Its purpose is to give the participants an opportunity to

- Learn what a task is and how a job is broken into tasks
- Define and analyze an audience
- Develop empathy for the customer

The participants will be divided into groups and be asked to perform a common task. Each group will receive a different set of instructions. At the conclusion of the workshop each group will be asked to evaluate the instructions they received.

The Poster Exhibit
Need to Know: The Way to Go— Mixed-Media Triptych on Task Analysis

The task analysis mixed-media poster exhibit by Bernice Casey, Allan Edmands, and Amy Lipton has three parts: a television drama (video medium), a placard (print medium), and an IBM Personal Computer game (online medium). Its purpose is to:

- Introduce how task-oriented information fits a user's need to know
- Provide users a chance to experiment with task analysis
- Be an example of technical communication using not just print medium

A Task Analysis Primer for Technical Communicators

Robert Ward

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In this paper I present a six-step method for developing a task analysis. Then I explain how to use that task analysis to design, develop, and test an easy-to-use information package. I organize the paper through a series of questions and answers so that I too am providing the readers with the information they need to know and in a form they too can easily use.

Why Should You Concern Yourself with Task Analysis?

A technical information package presents its intended audience with the information that audience needs in order to complete a job or set of tasks. A good one presents only the information the audience needs to know and presents that information in a form the audience can easily use. Designing and developing such an information package is a tall order and presents the technical communicator with many problems.

In order to do so, you, as the technical communicator, must understand the audience and what that audience is attempting to accomplish – the goal, if you will. You must understand the point from which that audience starts, the actions they must take, and the environment in which those actions must be taken. Only after understanding all these factors can you determine the information requirements.

In other words, you must analyze all the tasks that must be performed, and you must use that analysis when designing and developing the information package. This is the essence of *task analysis.*

The alternative is to present all the information that you can think of and let your audience sort it out. If you've ever read a set of instructions and not known where to begin after reading them, chances are you were using such an information package. These information packages frequently lead to the following reaction: "Now I know how it works. What do *I* do to make *it* do that?" Those familiar with the information packages provided for some information processing systems are all too familiar with the problem.

And if the problem isn't already complicated enough, what do you do when several audiences are performing interdependent activities that must be coordinated in order to accomplish an overall goal? The goal, or ending point, for one audience might very well be the starting point for another. A task analysis is an absolute necessity in order to solve the problem.

What Is a Task?

Before I define "task analysis," perhaps I should say a word or two about what a *task* is. I am defining the term from the standpoint of a technical communicator, not a social scientist. My definition is more like that of applied engineering rather than that of pure science, for I am more interested in practical use than in theoretical description.

A task, at its simplest, is an action taken by an individual to accomplish a goal. It has a starting point and an ending point. A task is a goal-directed activity. If I were to ask you to walk the perimeter of the room, would you be performing a task? Think a moment. . . The answer is no, for I didn't tell you where to start and where to stop. If you were to follow my directions explicitly, you would walk forever, rivaling Charlie's ride on the MTA as he rode forever 'neath the streets of Boston. Many of us have fallen into this trap and called an action a task. The result is usually difficult-to-use technical information.

A task, then, has four components: (1) the performer, (2) the starting point, (3) the action, and (4) the ending point. Let's look at each of these components in more detail.

The *performer* (or performers) is the person (or persons) taking the action to accomplish a goal. If you think primarily in terms of information, you probably call the performer the *audience*. I propose that we use the word *performer* instead of *audience* because *performer* connotes the active role the person plays. *Audience* implies a certain passivity, which is not the case. Besides, as you'll see a bit later, information is only one of the components of a task analysis. I believe that we as technical communicators prefer the word *audience* because we think in terms of the part we supply, the information, not of the entire process. The performer is always expressed as a noun. For example, if you were describing a professional carpentry task, the performer would be a carpenter.

The *starting point* is a thing, or a set of things, and a state of being, or condition. It is where the performer begins. If we were to develop the carpentry example to describe the nailing together of two pieces of wood, the starting point is the assembly of a hammer, a nail, and two pieces of wood of the correct size. The state of being, or condition, is that the two pieces are not fastened together.

The third component, the *action*, can also be called the activity, or operation. It can be physical or mental. It is what the person does and is always expressed as a verb. To decide between alternatives is a mental activity, whereas hammering a properly positioned nail into two pieces of wood is a physical activity.

Finally, the *ending point*, or goal, is the final result. It is the goal in this goal-directed activity. It, too, is a thing, or state of being. To continue with our carpentry example, the assembly of two pieces of wood fastened with a nail is the ending point, or the goal of the task. Viewed as a thing, it is now a longer piece of wood – a compound board, if you will. Viewed as a condition, or state of being, it is the assembly of two pieces of wood nailed together. Either view is correct.

If we were to define the forementioned carpentry task using my definition, it would look something like Figure 1. Granted, this example is rather simple, but it does illustrate the definition.

Performer	Starting Point	Action	Ending Point
Carpenter	• A hammer • A nail • Two pieces of wood (of the correct size)	1. Correctly position two pieces of wood. 2. Correctly position the nail. 3. Using the hammer, pound the nail into the pieces of wood.	Two pieces of wood fastened with a nail

Figure 1. Fastening Two Pieces of Wood—a Professional Carpentry Task

However, suppose we were to change the performer to an aborigine who had never before seen a metal hammer and metal nails. Would this example be detailed enough to be self-explanatory even if written or illustrated in a manner the aborigine could understand? I think not, for we can assume almost no knowledge about the subject at hand. For this new performer we would have to precede the carpentry task with another task – namely a learning task: "Learning how to use a hammer and nails." And suppose something were to go wrong. Say, the nail bent because it was not hit squarely with the hammer. Or suppose the pieces of wood moved as the nail was pounded. Now the problem becomes complicated by the necessity of learning (or perhaps relearning) and recovering from errors. Our task has grown in complexity just as the technical tasks we must describe grow ever more complex. Does this sound a bit farfetched? Think of someone attempting to use a personal computer for the first time. Isn't that person rather like the aborigine trying to follow our instructions for fastening two pieces of wood? In fact, aren't many, if not most, of the instructions we write directed to people who will be new to the task at least once?

You are probably asking yourself, "Which of the four components of a task is the most important?" and answering, "Probably the performer." This monologue is rather like saying to yourself, "Which leg of a four-legged workbench should be sturdiest? Why, the first one!" But as we know, all four legs of a workbench are of equal importance. The strength of a workbench is not determined by its strongest leg, but rather its weakest. So it is with a task. All four components are necessary and they are all of equal importance. So for our purposes, a *task* is a performer, beginning at a starting point and taking some kind of action to reach an ending point or goal.

There are three levels of tasks. The most general, or encompassing, are called *high-level tasks*. We can break these high-level tasks into one or more tiers, or echelons, called *subtasks*, or *lower-level tasks*. As we describe the tasks in ever more detail, we become very specific. We call these very specific descriptions *steps*. Steps describe the specific sequence of actions that a performer must take in order to complete the series of specific goals necessary to accomplish the overall goal stated in the high-level task. Sound a bit complicated? Well, it really isn't. What we really have is a tasking hierarchy, as illustrated in Figure 2.

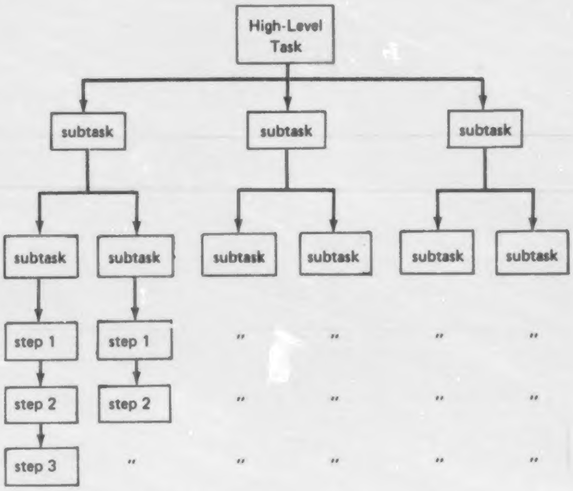

Figure 2. The Hierarchy of Tasks

The carpentry task described in Figure 1 I would actually call a subtask, or low-level task. I used it as an example of my generic definition of a task because I felt it more clearly illustrated the four components that make up a task. Figure 3 shows an example of the high-level carpentry task from which I derived the subtask example contained in Figure 1.

There are actually a number of subtasks we could derive from the high-level task in Figure 3. Each subtask would be determined by the kind of fastening desired. We could use nails for one kind of fastening. Then, of course, we would have to determine the kind of nail. Or we could elect to use screws or glue, or even wooden pegs. In the case of Figure 1, I have illustrated the subtask based on the use of nails, which provide a certain kind of fastening. This subtask could be further broken down by the specific goal (strength, finish, etc.) until I had enumerated a series of steps.

Performer	Starting Point	Action	Ending Point
Carpenter	Tools, fastening implements or substances, pieces of wood	Use tools and implements or substances to fasten the pieces of wood	Pieces of wood fastened to one another

Figure 3. Fastening Two Pieces of Wood—a Professional Carpentry Task (High-level Task Description)

What Is a Task Analysis?

A task analysis is the procedure of: (1) breaking a task into subtasks and steps, (2) identifying the relationship of those tasks, subtasks, and steps, and (3) identifying the environment and information requirements for each task, subtask, and step. It can be descriptive, proscriptive, or some combination of the two.

We can analyze tasks that are performed by one person, or we can analyze a complex series of interrelated tasks that involve a number of performers. The carpentry task we used earlier is a simple task – that is, it involves one performer. However, the task of building a house is complex, for it involves a number of performers. At least some of those subtasks must be performed in a set order. For instance, masons must lay the foundation before carpenters can do the framing. Then there's the tasks involving electricians, plumbers, and so forth. Order is extremely important.

How detailed should the analysis be? That is a matter of judgment, need, resource, and the availability of information. A descriptive task analysis can be extremely detailed from the first. Though the task analysis for a developing product will be initially high-level, it becomes more and more detailed as the design of the product is refined.

How Do You Develop One?

The process involves six steps:

1. **Define or describe the characteristics of the performer.**
2. **Define or describe the starting point.**
3. **Define or describe the action, activity, or operation.**
4. **Define or describe the ending point, or goal, for each action.**
5. **Define or describe the environment in which the performer must act.**
6. **Establish the information requirements for the performer.**

The first four steps are the steps necessary to define or describe the four components of a task. Steps 5 and 6 complete the analysis for the individual tasks. If you are performing the analysis for a series of related tasks involving several performers, the tasks must be described in the sequence in which they are performed, for the ending point for one performer is the starting point for the next.

The tasks can be broken down into subtasks and steps subject to the needs and limitations previously stated. The task analysis procedure is iterative, and the six steps are not necessarily performed in the order listed. When from a product standpoint, the function is the driving force – such as it is with large operating systems – you'll probably begin the task analysis by defining the activity first. When the driving force is the performer -- such as it is with a word-processing product – you'll probably begin by describing the performer. However, regardless of the step you perform first, you'll have to complete the other five steps. Unfortunately, in a short paper such as this, I can only outline the methodology.

How Do You Use It?

A completed task analysis is an ordered set of tasks or, in essence, a scenario. It establishes the information requirements and provides the information that the technical communicator needs to design and develop an information package for a product. Again, I must be brief. The process of using the task analysis also involves six steps:

1. **Validate the task analysis.**

   Through review by experts, observation, prototyping, simulation, and other techniques, validate the task analysis.

2. **Set measurable criteria for the tasks.**

   Establish measurable criteria for the tasks. Determine such things as how long it should take to complete a task, what the error rate should be, and how satisfied the performer should be.

3. **Design the information package.**

   Using the information provided by the validated task analysis, design the information package to fulfill the designated requirements.

4. **Set measurable criteria for the information package.**

   Since the criteria for use of the information are a subset of the criteria for the task, they must be established in conjunction with those set for the task itself.

5. **Develop the information package.**

6. **Perform iterative usability testing.**

   Test the package as it is being developed, and modify it accordingly.

This six-step process is itself iterative; changes in one step should cause a reevaluation of others.

Does Task Analysis Have a More General Applicability?

The answer is an unqualified yes. The six-step method of task analysis can be used by technical communicators to determine what a performer needs to know. However, this methodology can also be used by anyone who must describe, determine, or proscribe what a person or group of people must do in order to accomplish a goal or set of goals.

When you think about it, a book or set of books is an interface. True, a particular kind of interface, but an interface nonetheless. A programmer must perform the same kind of analysis in order to design an online interface for a computer program, for an online interface – whether it's commands, menus, help screens, or messages – is also information that must be used by people to perform tasks. You can even use this methodology in your daily life. If you are faced with a series of things to do and don't know where to begin, you can use it to organize what you must do. I think you'll find that this method of task analysis has far-reaching applications.

Though I have not been able to describe task analysis in great detail, I hope I've been able to provide you with the information you need to know in order to get started.

ACKNOWLEDGMENTS

A number of people participated in the development of the ideas I present in this paper. I cannot thank them all specifically, so a more general thanks will have to do. I would like to recognize my debt to the following: Dr. Robert Miller, Ralph Jones, and Suzie Calvert-French of IBM Raleigh; John Hoffman of IBM Austin; and finally the students in my classes, from whom I have learned much.

Task Analysis: Applying Composition Theory in an Industrial Forum

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Bridging the gulf between academic theory and basic research, on the one hand, and industrial applications on the other, is a challenge in any profession. In our own profession, writing theorists have been preaching the importance of a pre-writing stage for decades. More recently composition research has shown that this preparation stage is a prime determinant of document quality. Within industry we are taking note of and applying these recommendations to our mode of operation. The task analysis meeting is one particularly effective and efficient way of preparing for a writing project. A scenario of a task analysis meeting is provided to show how this can be done.

The Theoretical Rationale for a Pre-writing Stage in Composing

As writing teachers have been asserting over the past decades, the crucial first step in any writing project is preparation. This preparation is usually broken down, in an attempt to move from the abstract to the concrete, into three main substeps: identifying the reader, establishing the objective, and determining the scope of the writing assignment.

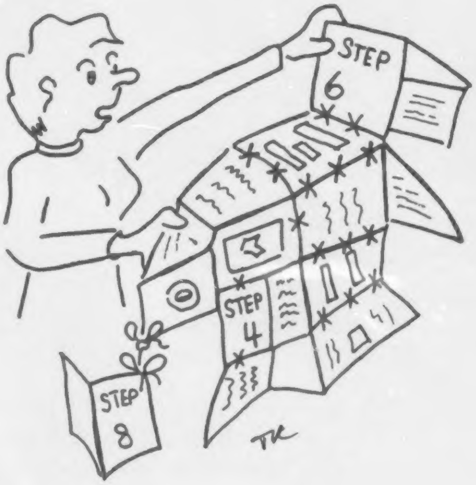
More recently Linda Flower, a leader within the field of composition research at Carnegie Mellon University, has emphasized the importance of transforming writer-based prose into reader-based prose.(1) Though writer-based prose might be perfectly comprehensible to its author, it may be terribly confusing to its intended audience. I don't suppose it will tax most of us in the field of technical communication to understand why this could be so.

Writer-based prose, with its egocentric focus, its narrative organization, and its survey structure, lacks the primary ingredient that contributes to the attribute "usability." That is, the ideas are not organized around the ***reader's needs and goals***. Somehow, in this situation, the writer neglected to identify the reader and to ***write with this person's objective in mind***.

With this advice from both our traditional writing teachers and leaders within the field of composition research, we are aware of the great importance of the very early phase in the writing process. Faced with the constraints of reality, however, can most of us expect to bring these concerns to fruition in a discrete planning stage?

The Real Link Between Preparation and Usable Documents

Faced with the inevitable shortness of time and, if we are lucky, a wealth of writer-based (read "designer-based") raw material, we are in constant danger of neglecting these cardinal concerns when drafting our documents. Production deadlines and current operating procedures may lead some writers to conclude, regretfully, that the best they can do is to perform a patchwork function: that is, gather the source material, stitch it together here and there with appropriate transitions, polish this sentence, and clear up that syntactic ambiguity. The result of this labor is a writer-based document with a survey structure, but at least, we writers can proudly assert, we've presented a ***comprehensive*** survey. If the readers hunt through our material long enough, with tenacity, we are sure they will be able to find every piece of information that they could ever possibly need.



Unfortunately, this type of document structure is not usable since it is not organized around the reader's needs and goals.

Bond, Hayes, and Flower, doing research for the Document Design Center in Washington, D.C., studied the processes that several writers went through to revise writer-based legal documents into reader-based material.(2) They found that the best revisions were produced by those writers who read through the ***entire*** document before making any changes. These writers went on to massively reorganize the material, while the others simply polished sentences here and there to improve the existent flow.

Similarly, when we are not revising, but instead are creating a document, we need some way of viewing the material globally ***before*** writing. In this way we can build the framework into which to insert each piece of information.

The Task Analysis Meeting as Preparation for Writing

Given sufficient time, good technical writers can, without other institutionalized structures, sift the reader-based wheat from the designer-based chaff. By studying the technical source material, by painfully but steadily processing it through our own gray matter, by learning the characteristics of our users, and by individually tracking down and interviewing the appropriate developers, we can determine the appropriate structure for our documents. Seldom, however, do we have enough time allotted to do superb work given this methodology.

Our professional challenge, therefore, is to streamline our processes, to most quickly, efficiently, and productively manage the time available in order to transform the mass of designer-based raw material into an organized, high quality, reader-based flow.

The remainder of this paper describes such a streamlined process, the ***Task Analysis Meeting***. This meeting is an institutionalized forum for accomplishing what we know to be the all-important preparatory steps in any writing assignment. Hearkening back to our writing teachers' words of wisdom and using the Document Design Center's expansion upon the preparation stage, prior to writing we should do the following:

1. Determine the scope
2. Define the audience (identify the reader)
3. Define the purpose (establish the objective)
4. Determine the task or tasks
5. Determine the constraints (posed by the system or by how the document will be used).

Though this meeting is labeled a "task analysis" because determining the tasks or tasks is the primary focus, you will see shortly that this structure actually encompasses all the preparatory steps.

A Scenario of a Task Analysis Meeting

Robert Ward has outlined the general steps involved in analyzing task structure. As we know, we human beings learn best by example. Most of us, therefore, provide abundant scenarios in our literature, in order to aid our readers. In the jargon from Carnegie Mellon, we "instantiate" our scenarios for our readers. In plain English, and in the spirit of a good technical communicator, I'd like to provide you with a concrete example, a case study of this proposed information development forum, the task-analysis meeting.

I'm drawing this example from my experience last summer as a writer on a special project at IBM in Kingston, N.Y. Robert Ward set up and presided over a task-analysis meeting that took place before I set pen to paper or, more accurately, before I set finger to keyboard. The reason I can hold this experience up to the light is because it was an acclaimed success. Moreover, there was no new development effort necessary for this project, no new code needed to be written; the project involved documentation alone.

Let me qualify myself at this point and make it clear that, while the output of the project was documentation, the success of the project did not rest upon publications personnel alone. Many people were critical to the project, including product designers, developers, and testers. The task analysis alone would not have been sufficient to ensure the quality of the documentation, but it was the crucial first step. This important first step was followed by usability walkthroughs, human factors testing, technical reviews, and hands-on use of the documentation in the Systems Test laboratory.(4) This paper, however, will focus upon the first step, preparation, and its role cannot be minimized.

For this task analysis meeting, Ward reserved a conference room for three hours and invited representatives from Product Usability, Product Design/Development, Quality Assurance, Systems Test, and Publications. Depending upon the nature of your project, you might want to include others such as field engineers, service engineers, and marketing representatives.

The Explicit Purpose of the Task Analysis Meeting

Typically, the raw source material for any new product or function is written by experts on the subject matter. The material is organized around the internal structure of the product or function and is not written to explain its use or even to promote understanding. This makes sense, since the prime function of the person doing this writing is to ***develop*** the product. The entire interest of the designer is, and had better be, focused on the simplicity and elegance of the internal structure.

Teaching someone how to ***use*** the product is an entirely different concern, however. The purpose of the task-analysis meeting is, therefore, to elicit from the subject matter experts, information that is procedurally and user oriented.

Ward introduced the goals of the meeting to the ten of us present and outlined ***our*** tasks for the day. On a flip chart, he set up four vertical columns. The column labels from left to right were the following:

- Action
- Audience
- Information Requirements
- Result

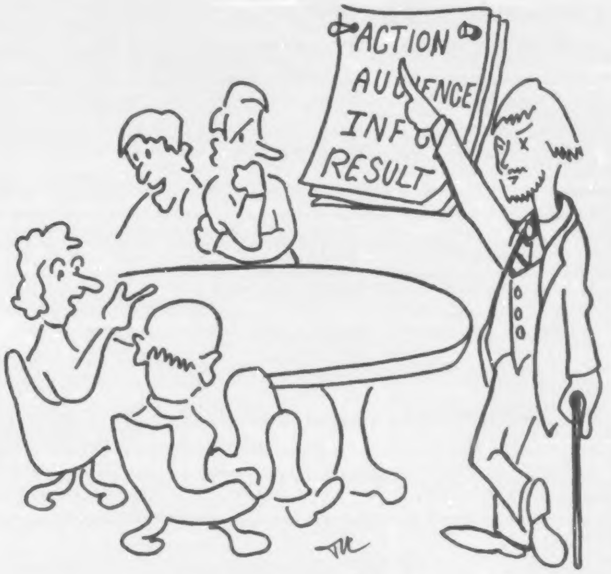
Note: Environment would normally be another column but in this particular case we had already identified the environment and it was not a variable.

We were to generate, in the proper sequential order, all of the tasks that our users would have to perform in order to use this new capacity. For each task we would then identify who exactly in our typical consumer's company would be performing the task, what information that person would require in order to perform the task, and what results we expected upon completion of the task.

For example, in this initial meeting, we concluded that there were ten major tasks involved in this procedure. Task number 2 was planning and included planning for hardware configuration and software customization. The targeted audiences were the hardware administrator and two software system administrators. These titles implied, of course, a certain educational and experiential background. The information required was a list of sequential steps needed to make a particular connection. The result we expected upon completion of this task was a list of logical addresses and station addresses to pass on to the person performing the next task.

Just to give you an idea of the range of tasks and audiences involved in this project, task number 6 was logging on to a word processing product. Our targeted audience was a text operator, such as a secretary. This operator would require the log-on procedure and information on correcting the typical errors that could occur during the log-on process. The result we expected upon completion of this task was that the operator could edit text files.

As the group generated this information, Ward wrote it all down on the flip chart. As Peter Elbow asserts, the act of writing, the visual feedback we derive from the words we place on the page, actually helps us to pinpoint the gaps in



Task 2: Planning

Action	Audience	Information Requirements	Result
Hardware Planning	Hardware Administrator	Description of hardware requirements for both systems	Hardware plan describing terminal locations, telephone lines, modems, diagram of physical addresses
System A Software Planning	System A Software Administrator	Description of System A's requirements for the connection	List of logical addresses and station addresses for use by System B's Administrator
System B Software Planning	System B Software Administrator	Description of System B's requirements for the connection List of addresses from System A's Administrator	System B Configuration Worksheet for use in next task

our thinking and to identify the directions in which we want to go.(5) The visual feedback from the flip chart helped us in our attempt to generate thorough and sequential material.

As in the cliche "the whole is greater than the sum of its parts," the information generated in this collective exercise was more comprehensive than we could have extracted through individual interviews. Moreover, not only was the information more comprehensive, but our use of time was *much* more efficient.

The success of the meeting depends on the writers' ability to extract procedural information from the developers. I recall asking questions out of my ignorance that slowed the pace of the meeting. These questions, however, resulted in concrete, step-by-step, procedural information, rather than an abstract overview that could inaccurately assume too much of the user. Ignorance is actually a blessing at this point in the process because it forces the writer to approach the material from the outside, from the perspective of a novice user.

Summary: The Importance of Task Analysis

In closing, why should we bother with task analysis or, more importantly, why should we care to produce reader-based material? Coming from the outside in, the consumer's first contact with our products is usually through our documentation. As we know, first impressions are extremely resistant to change so, unless we have a captive market, we can ill afford to create a negative first impression. It is doubtful whether the consumer can distinguish between product usability and document usability and, therefore, non reader-based literature could be severely damaging. Performing this type of task analysis before writing a single word, satisfying the prescriptions of writing theorists, may make the difference between designer-based material and ***usable***, reader-based material.

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Need to Know: The Way to Go—Case Study in Task-Analysis Use

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Abstract

This paper describes a different use of task analysis from the one described in the "Task Analysis Primer" by Robert Ward. Task analysis is a process that can be used at any time that information for the user needs some definition, refinement, or focus.

The first iteration of the task analysis defined the information needs of our product, a software program. A second iteration of the process refined the information needs of one task, diagnosis.

Within each part of the paper, our experience with the process is described: How we went about the task analysis, what we learned, and the impact that the task analysis had on the style and presentation of task information.

The Beginning

The task-analysis process started with a meeting among the product design, development, and publications groups. At this meeting, we discussed a predefined set of task questions to determine what subset of universal tasks (customization, evaluation, diagnosis, and so on) would be done with our product. The result was a general description of the tasks and the information needed in a printed information library.

That first task analysis determined *general* task descriptions, audience, and information needs. But exactly what information was needed for a particular task and the most effective way to present the information were questions that we needed to answer.

The focus of this paper is the diagnosis task, the job of determining that a problem with a software product exists and of collecting data about the problem so that it can be fixed. The task is special in that it involves an interface between the customer who uses the software product and the manufacturer who fixes program code errors. The information that we publications people produce is for the customer, the person who discovers the problem and gathers data so that the manufacturer can fix it.

Define Characteristics of the Audience

Publications people started working with this product as it was being designed. Concurrently, the design group was working with a potential customer on exactly what was needed in the product. Reports on these customer requirements became part of the design/development meetings that publications people attended.

During these meetings, we learned not only what the customer needed, but also what the customer was like. We became aware of customer interests and skill levels. We learned that the customer had a very complex software system with many interacting products. One use of our product could be in retail sales—an environment in which users of the system range from point-of-sale terminal users to highly skilled application programmers. The customer's system also showed a high degree of sophistication in the way in which the products were combined to meet business goals—the customer's main interest.

The diagnosis task is usually the responsibility of a person who is a data processing professional, but who is most familiar with the data processing application for which the system was put together. For this person, the task information should be:

- **Limited to task-required information:** Nice-to-know information about how our product worked need not be included. Information that is needed for the task must be complete, even though that information might exist in other books as well.
- **Procedural, but not tutorial, information:** Procedural information assists the reader in completing a task efficiently. Tutorial information is unnecessary for this person. Procedural information provides "how to" information within the steps, and most problem isolation and analysis techniques are used by the reader with other products. Procedural information focuses on the work to be done.
- **Simple and direct:** Keeping the writing style simple and direct makes analysis of the problem as clear and efficient as possible. We expect the reader to scan for the information needed. We would use lists, tables, graphics, examples, anything that would aid the reader in extracting needed information.

Define the Environment

The design/development meetings also provided our understanding of the customer environment. Our understanding was expanded through interviews with field people who knew the customer or similar customers. Our technique for interviews tended to be somewhat free form: Since we didn't know exactly what information we could get, we would start with general questions and then dig for more. Sometimes people would answer a question with a very terse, test-question answer; then the digging would uncover more information. Other people would answer with an anecdotal experience; the digging would test generalizations derived from the anecdotes. At other times, the answer to one question contained a word or phrase that would lead to other, more important, questions.

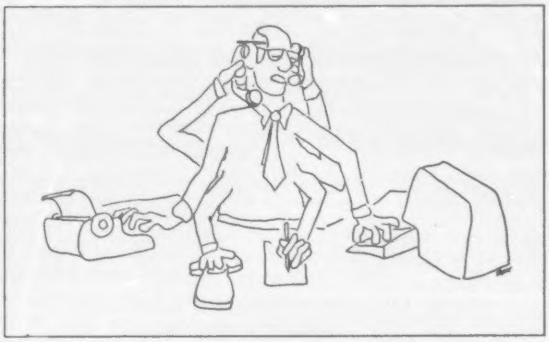
The meetings and interviews gave us a view of the environment in which each task would be completed. This understanding is critical to deciding how to focus the information in a manual.

We decided that the following characteristics about the task environment needed to be considered:

- **Pressure:** When a system is not working, people cannot do their work; the cost of such downtime is sizable. The irritation of system users increases the pressure.

  More pressure comes from product reliability: Readers may not encounter problems with a particular product more than once every year or two.

  To keep this pressure in mind, I frequently looked at this cartoon representation of the person doing the diagnosis task. (He doesn't even have room for my manual.)



  Retrievability and ease of comprehension are key attributes for information used in "crisis mode." Procedures and lists organize information into parallel chunks; both parallelism and chunking aid comprehension and retrievability. Explanatory paragraphs should be kept to a minimum.

  The reading level should be ninth grade or lower. A low reading level assists in the comprehension of abstract information; it also helps the reader to find relevant information more easily. The less rereading the reader does, the faster the reader understands the information, and the faster the task is completed.

- **Need to take swift, correct action:** There are no bells, alarms, or messages that come out automatically with our product. Most problems appear as slowdowns, not getting a response in a reasonable time or just not getting any response.

  A normal reaction is to try to restore the system. But information about the problem is contained in product tables and messages. The reader must request the information, and the request must be made before the information is overlaid or discarded. Failure to do so can result in having to recreate the problem before normal operation is restored. Often there are multiple ways to get the information; some are more disruptive to normal processing than others.

  Data-gathering requests should be specific; exact commands should be given with information required for variable fields explicitly stated. Each command should be centered on a line by itself. Data-gathering commands should be listed in order from least disruptive of normal processing to most disruptive.

  Examples of correct processing are needed. Knowing what the fields of a record should contain and what sequence should occur in correct processing can be quite helpful. Deviation from correct processing can indicate the source of a problem.

Define the Task, the Starting Point, and the Expected Result

Defining exactly what steps the reader could take to solve a problem was of critical importance to determining what information is needed. We began with a vague idea of how the task would be done. This was the task description defined initially, but we needed to know exactly what steps should be done, in what sequence the steps should be done, what the starting point would be, and what the result of the steps would be. We needed to refine the task description, to do another task analysis. So we held a meeting with service people who worked with customers.

At the end of the first day of the meeting we were ready to quit. We were asking for general steps and the service people were giving us anecdotes or war stories. We weren't getting what we needed.

We were asking for steps to use for any problem. That is, we were asking for generalizations; we were getting specifics. It takes a particular and rare kind of mind, it seems, to be able to form a principle from specific data. We couldn't convince the people with whom we were working that a single process could be used by all customers to work through any problem. Customers differ in the way in which they approach problem resolution. There are as many different problems as there are ways to solve them. Each problem requires different information for analysis. We simply couldn't find the forest for all the individual trees.

Finally, the cooler head of our manager prevailed. The next day we returned with a set of generalizations that were derived from the anecdotes and war stories. One of the product designers came with a set of general steps for another part of the task. It worked. We finally had general steps, independent of particular information, that anyone could use for any problem with our product. We had a procedure for completion of the task.

We also had identified major problem types—inadvertently. Since a procedure starts with a symptom and progresses through prescribed information-gathering and information-analysis steps, the types of problems are defined by the problem symptom. Problem symptoms are the starting point for the task steps.

However, we still had work to do: It was now apparent that the task of diagnosis had a tree structure. Diagnosis for our product started with a system malaise as the symptom. An initial analysis procedure was needed; the goal was to identify a specific symptom that would direct the reader to an appropriate problem procedure.

Further discussions with the service people were held. In these discussions, we specified the symptom (starting point) for each problem type, and they gave us the information needed by the manufacturer for problem resolution (the goal). This was much easier to do than to determine the problem-analysis steps. (After I read the "Task Analysis Primer," I realized that our difficulty arose from defining steps before we knew the starting point and goal.)

This process produced some revelations that had a direct effect on the information needed to perform the task:

- **Problem analysis may have three stages:** First the reader must collect, organize, and report information about the problem to the manufacturer. The report is made by telephone to a person who searches the manufacturer's list of known problems. If the customer's problem matches a known problem, a problem fix is given to the customer immediately. Most problems reported to the manufacturer are a repeat of a previously found problem; most should be resolved at this stage.

  The second stage involves looking at additional information about the circumstances under which the problem occurred. The types of information and its sources are identified for the reader. Thus the reader can have the information at hand for this second call. Additional problems are resolved with this call.

  Finally, for a new problem, the manufacturer needs certain data in order to fix the problem. We needed to alert the reader to what that data might be. Since the gathering of this data may necessitate re-creating the problem, this gives the reader a chance to gather the data at a convenient time, a time when degradation would least disrupt normal operation of the system.

  Note that each stage of problem analysis involves an interface between the customer and the manufacturer. Information is passed from one to the other. The smoother this dialog is, the faster the problem can be resolved. Stating the information that could be requested sets mutual expectations for the exchange and gives the best chance for success.

- **Problems with our product can be caused by an error made by the customer or by another system product:**Throughout the analysis of the problem, information is scrutinized for clues that point to other causes. When such clues are found, the manual refers the reader to the diagnosis book for another product or to information in the book for another task of our product. To continue with the diagnosis task for our product would be fruitless.

- **The data-gathering steps must be as simple as possible:** The reader's first instinct is to restore the system. To counter this instinct and get error information before it is lost, the procedure steps must be as simple and efficient as possible. Analysis of the data can follow in later steps done at a later time.

Establishing Information Specifications

Shortly after this task analysis was completed and reviewed, the manual was assigned to me to write. I wrote an outline for the manual and briefly described the information that would be required by each step of the procedures. The outline became the information specification for the task and was put into the publications plan.

Through the review and inspection of this plan, inadequacies, inconsistencies, and superfluous information were identified and remedied. Suggestions for additions were discussed. Sources of additional information were identified.

Gathering Source Material

We were familiar with the functional specifications and detailed design of the product through our participation in the design/development process. The "specs" are the source of all technical information about our product. Because information in these documents is written for code development, use-related information is rarely included.

What other information is needed? Again we talked to the service people. This time I asked them what information they would need at each stage of problem analysis for each type of problem. More than once I also asked why some information was needed. People seem to have a penchant for asking for everything, even though some information would never be used. I wanted to be sure that the procedures do not ask the reader to gather unnecessary information.

Where is the information? How do you get the information? The next step was to find out where the problem information is, what service aids pick up and record the information, and how disruptive to processing each service aid is. The service aids are not only part of our product, but also part of others with which our product works. Publications about all the other products were collected—and at least skimmed. Error codes from our product and other products could contain information useful in the procedures; useful codes were identified and collected for appendix material.

There is no substitute for total immersion; I read and read.

Writing the Manual

The front-end work, the task analysis, really pays for itself. The first draft of the manual took about a month to write; its procedures were almost in final form in the first draft.

The tone of a manual is so important: My vision of the task is that the reader is under pressure and is doing a job that doesn't directly help to do business. To set the tone, I identify with the reader doing the task, just as I would identify with a character in a novel. What does the reader need to do? What does the reader need to know to do that step? These are questions that help a writer create reader-based prose, as Candace Soderston calls it in her paper. It helps me to focus on reader actions and information needs.

Efficient completion of the task was a primary concern: Each procedure step starts with "do" statements that direct the reader through the procedure. These "do" statements are set in bold type on lines by themselves. Explanatory information is set in roman type and written in paragraph form with as many lists, tables, examples, or pictures as possible. Commands are centered on lines by themselves; examples of correct processing are indented or set in a different type face.

The bold-faced "do" statements begin and end each numbered step of a procedure; reading just the bold-faced statements provides a fast track for the expert who does not need explanations. The sequence of the numbers reflects an order for completing the task. That order is not the only way to complete the task, but it is a way that works for anyone. The expert could choose another way to complete the bold-faced statements.

Having the right information well organized for the call to the manufacturer is also important. A program information sheet that can be photocopied provides a form for the reader to organize the information as it is recorded. Completion of relevant parts of the program information sheet sections signals completion of the task.

I knew that the reader might be using this manual when he or she should be using another one. Throughout the procedures, cross-reference statements direct the reader to other manuals when information indicates another source for the problem. These statements direct the reader to turn over the problem and related information to the person responsible for the other task or the other product. It is important not to have the reader continuing the task when information shows that it is the wrong one.

As I wrote procedures, I found the trace information very difficult to use. You had to leave the procedure and to use information simultaneously in three or four other sections of the book. The reader shouldn't have that much difficulty. So I developed a template that can be laid on the records and that contains summary information to explain the hexadecimal codes in the records. The template is separate from the manual so that the reader does not have to turn from a procedure to interpret trace records.

Information that is needed in a procedure step is included in that step. Some lists of codes were too long to be included in the procedure steps; these lists were placed in appendixes of the manual. These lists also contain information in italic type that specifically describe how our product uses standard codes. Other appendices contain information that describes how our product processes work—for those experts who are inordinately curious.

Results

The ultimate test for a technical manual is whether the reader likes it. The first customer to use our product provided a report on its introduction into their system. They were satisfied with the product and its publications. They liked this manual and did not feel that the eighth-grade reading level "talked down" to them. They singled out the template as an excellent idea; they wished more IBM products had templates.

They liked it. Praise from the reader always makes a writer's heart sing.

Considering the potential novelty and value of the template, IBM has applied for a patent to protect the idea of using a template to decode programming information.

Conclusions

The user sees an abstract, software product in its information. Information is displayed, flashed in signals or alarms, or printed in manuals. When the user likes what he or she sees and when the information helps to use the product effectively, product satisfaction is a likely result.

Task analysis is a process by which the information needed to use a product can be identified. But, as I have indicated in this paper, the task-analysis process can be equally effective in answering questions that influence the style and format of the information:

1. What does the reader need to know to do the task?

2. What is the best way to present this information?

For our product, the process of task analysis determined the information that the reader had a need to know and provided us with the sensitivity to improve the format and style of that information. That our product was well-received by the customer is not solely the result of the information in the manuals, but it didn't hurt!

Acknowledgment

I would like to thank John Shea for his artwork; his rendition of the diagnosis task person appears in this paper.

To Print or Not to Print: Choosing Alternative Media

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Information has traditionally been presented in printed form. Because of advances in technology, other media have sprung up in recent years. Technical communicators must become familiar with the advantages and disadvantages of these alternate media. They must consider the audience, the tasks the audience will perform, where these tasks will be done, and the type of information to be presented. Most important, communicators must assess the media and their relationships to these factors before making decisions on how to package information.

Books have been for years the main conveyors of technical information. However, the expansion of technology has introduced several alternatives to this tradition. As professionals, technical communicators must become familiar with the options available.

What to Consider When Choosing a Medium

The growth of media choices for communicators is analagous to a child allowed to choose anything in a toy store but to choose only one item. Communicators are faced with a wealth of opportunities but are overwhelmed to the point of not knowing where to go first. The questions facing us boil down to:

- What medium or media should I use?
- *Should* I use a medium other than a book?

Audience

The audience is a primary force in your choice of medium. In assessing the audience, you must consider what they are comfortable with. Consider that most of today's potential audiences are part of the TV generation, so a video presentation is familiar to them.

Some background factors to consider for your audience are education, work experience (related to the tasks at hand), and reading level. For example, if your potential audience has a low level of education and a low reading level, books may not be the best way to convey information. You may want a more visual presentation.

Finally, you must consider which medium is easier for them to use.

Task

There is no way to overstress the importance of a thorough task analysis. If you've done such an analysis, you've already gathered information on the factors discussed in this section.

Specifically, you must consider what tasks your audience will perform before choosing the medium in which to package your information. Ask yourself **if the task being performed is a one-time-only task or if it will be done repeatedly.** If it's a task to be done once, such as installing a piece of hardware, an elaborate multimedia presentation will be too expensive. If the task will be done often and in an area where there is a high turnover of personnel, a training film on videodisk or video cassette may be best.

Ask yourself **how long a time will elapse between performances of the task.** A user who does the task every six months will have to be walked through the task each time.

Ask yourself **if the task must be done quickly.** An emergency procedure should never be buried in text.

Environment

You must consider **where the task will be performed.** Your user is limited by equipment availability as well as by the physical restrictions of time and place.

Ask yourself **if certain devices or services are required** for your information package. If you are documenting a product to be used in homes or small businesses, a presentation requiring expensive equipment such as video cassette players might be inappropriate. However, if your product involves a terminal display and users are likely to have these terminals available to them, online documentation is a possibility.

Type of Information

The type of information to be conveyed should help determine your choice of medium. Information to be used once does not merit an elaborate package. But information to be used repeatedly by many different people may be suitable in a videodisk or video cassette package.

Tasks that involve a user's participation would be best in a medium other than print.

If the information is primarily reference, consider if the user will constantly be looking it up or will need it when working on a specific task. Lengthy explanations and heavily detailed descriptions are best in printed form.

Why to Stay with Printed Material

There are reasons for staying with printed information. Many of us—technical communicators and audience alike—are comfortable with it because we're used to it. Not all companies can afford to get involved with alternate media documentation.

Some types of information are meant to be printed. Planning or information not required for the current task are just two examples.

Why to Move to Nonprint Media

The primary reason for choosing any media for packaging is that it is **the best way of presenting the information relative to the task.**

Books do not lend themselves to all tasks and all situations. Books are bulky. If information is spread out through several places, users need a lot of office space to accommodate the library.

Some information is better presented in other media. The sections under "Looking at Different Media" go into the chief advantages and disadvantages of the various media.

Looking at Different Media

After analyzing the audience and their tasks, consider the pros and cons for each media before choosing how to package information.

Audio Cassette

Audio cassettes are easily transportable. The required tape player can be fairly small. Users can choose where to learn, allowing them more privacy. They can also learn at their own pace, rewinding the cassette whenever they must review.

However, audio cassettes do have their failings. An extra piece of equipment is required (a tape player). Also, there is no visual stimulation unless the audio cassette is combined with some printed material.

Video Cassette

Video cassettes merge visual and audio information. Cassettes let users pace their learning, since the tape can be rewound.

Procedural and "how to" information in particular lends itself to a video cassette presentation. Putting training material on tape lets it be used by other users as personnel changes over. It also ensures that all users get uniform training.

The main disadvantage of video cassettes is that the player (called a video cassette recorder, or VCR) is expensive. While the popularity of video cassettes for entertainment is growing, there are still not that many people or businesses with VCRs. Not all users will want to invest in the needed equipment.

Video cassette projects can be expensive to produce. So carefully consider whether the task you are documenting warrants the medium.

Videodisk

Videodisks are very similar to video cassettes. They have all the advantages and disadvantages of cassettes, plus more of each.

Videodisks have an added advantage in that they are **programmable**. You can create a videodisk that lets users work interactively with it. Users can work down different paths of a task rather than just learn the information sequentially. They can take quizzes given on the disk. The videodisk player is also generally less expensive than the VCR.

However, videodisks are fairly new in the market. Many more users have VCRs than disc players and are not likely to invest in both.

Online Terminal Display

Users have the ability to learn at their own pace by choosing how to go through the different paths of screens and menus. Using online terminal displays is also advantageous as more technological schools increase the use of computers among students. Working from a terminal will be the learning environment of more and more students.

Using a terminal has one big advantage over other media. It can be used for more than learning. The terminal (and the computing power it accesses) is often required in at least part of the task itself.

Some types of information lend themselves to being presented online. Procedural information and messages are two prime examples. You might consider designing online "help panels" containing reference information **pertinent to the current task requiring a terminal.**

Online material has the disadvantage of not being aural. Also, you must determine if your audience has access to terminals and what type of terminals.

"Mix and Match"

Media can be combined to offset the disadvantages of a single medium. For example, a completely audio presentation does not supply any visual learning. Teaming an audio cassette and a manual would offset this.

One medium may not fit all who have to perform a task. Combining media generally implies mixing printed material with one of the other media, such as online information.

Conclusions

Dealing with the various media available to us today can be confusing and at times overwhelming. We should view it as an opportunity to create information better suited for users. The main points to keep in mind are:

- Alternate media are available today. You need not (and sometimes should not) restrict yourself to books.
- Task analysis related to audience, environment, and type of information is necessary before you decide on packaging.
- You can use more than one medium when you document a product.

Need to Know: Way to Go—Two Forms of Task-Oriented Information

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Two forms of task-oriented information are illustrated and compared: a fan-fold reference card and a 25-by-38-inch wall poster user's guide. Both forms document a menu-driven user interface called Interactive Productivity Facility (IPF) that runs on the IBM DPPX/SP computer operating system.

In our fervor to convert all information to task-oriented information, we may have conveyed the impression that there is one, and only one, correct form of task-oriented information. That is not our intention. There are many different forms that information can take. In this paper, I will discuss two different forms of task-oriented information for the same system function—reference information and user's guide information. I am going to illustrate how these two forms were used to document an IBM function called Interactive Productivity Facility, or IPF, which guides the user through the DPPX/SP computer operating system with a series of menus.

First, a little information about IPF. IPF is a user-friendly, menu-driven interface for a computer operating system. With IPF, users do not have to type commands or be concerned with command operands, keywords, or syntax. IPF displays task menus on the screen. The initial IPF panel is in Figure 1.

The user selects from the menu using the keyboard; if IPF has enough information, it performs the task selected, otherwise it displays another panel requesting information to do the task.

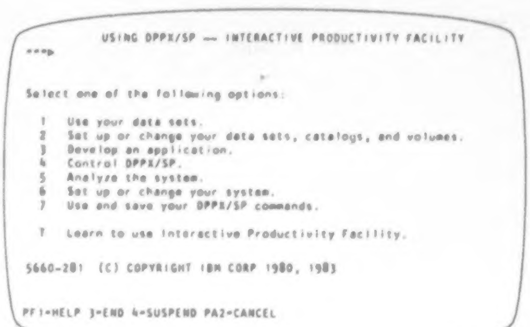
The designers of IPF understood what users wanted to do and created a task-oriented, menu-driven, hierarchically organized interface to do those tasks. Every panel has a title indicating the task the panel supports. And every task panel has an associated, unique help panel to define terms and concepts the user may want to know in order to use the task panel.

The system is task-oriented.
Every panel is the name of a task—for example, "Use Your Data Sets," "Write a New COBOL Source Program," or "Delete a Data Set."

The system is menu-driven.

Each menu panel offers a choice of tasks. For example, Figure 2 shows the menu options for the panel titled "Use Your Data Sets."

The system is hierarchically organized.
Major tasks head groups of subordinate tasks. For example, the "Use Your Data Sets" menu panel lets you only select subtasks (for example, editing, copying, deleting, and printing data sets) associated with the major task of using your data sets. To do some other task, such as writing a COBOL program, you must go to the section of IPF appropriate to that task.



```
            USING DPPX/SP -- INTERACTIVE PRODUCTIVITY FACILITY
===>


Select one of the following options:

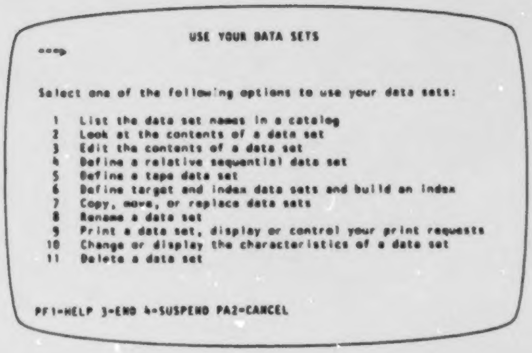
  1   Use your data sets.
  2   Set up or change your data sets, catalogs, and volumes.
  3   Develop an application.
  4   Control DPPX/SP.
  5   Analyze the system.
  6   Set up or change your system.
  7   Use and save your DPPX/SP commands.

  T   Learn to use Interactive Productivity Facility.

5660-281  (C) COPYRIGHT IBM CORP 1980, 1983


PF1=HELP 3=END 4=SUSPEND PA2=CANCEL
```

Figure 1. First Menu Panel of IPF



```
                    USE YOUR DATA SETS
===>

Select one of the following options to use your data sets:

   1   List the data set names in a catalog
   2   Look at the contents of a data set
   3   Edit the contents of a data set
   4   Define a relative sequential data set
   5   Define a tape data set
   6   Define target and index data sets and build an index
   7   Copy, move, or replace data sets
   8   Rename a data set
   9   Print a data set, display or control your print requests
  10   Change or display the characteristics of a data set
  11   Delete a data set


PF1=HELP 3=END 4=SUSPEND PA2=CANCEL
```

Figure 2. "Use Your Data Sets" Menu Panel of IPF

How Does a User Select Panels?

The user can continue with IPF's sequence or can "interrupt" IPF, altering the "natural" flow of panels. There are two ways to finish using one section and begin using another.

1. **The PF key way**

   The user presses PF keys that have been set to display a panel in the structured sequence of IPF: for example, the next panel, the previous panel, or the initial panel. The PF key way uses the functions built into IPF to "move around" within IPF. With this method, the user handles one kind of task at a time from beginning to end.

2. **The GOTO way**

   Many panels have ID numbers. The user can type GOTO and a panel ID number and IPF will display that panel. For example, the ID number for the panel "Edit a Data Set" is 1.3. To display the panel for editing a data set, the user types GOTO 1.3 and IPF displays the panel for editing a data set.

Documenting IPF

Just as the designers had understood the tasks the users would need do with IPF, the technical writer had to understand how someone using IPF would want to do a task. The problem in documenting IPF was how to present the GOTO numbers (panel ID numbers) so the user could match the GOTO number with the task in mind.

Stated another way, if a user is working through IPF using IPF's natural flow or sequence of panels, GOTO numbers are unnecessary. PF keys control the flow. But if a user wants to do unrelated tasks, contrary to IPF's logical flow of tasks, GOTO numbers are essential.

How will the user know which GOTO number matches a task? How can the documentation present the GOTO numbers effectively and efficiently?

Users need a retrievability aid, a way to match IPF's task panels with their own tasks. The user's guide fills that need.

Deriving the User's Guide from the Reference Guide

In creating the user's guide, I drew on my experiences using IPF and my observations of how people work on more than one task at a time.

At first, I depended quite heavily on the *IPF Reference Card* to learn IPF—the tasks it supported and the logical flow of panels in IPF for these tasks. See Figure 3 for a sample of the *IPF Reference Card*.

For the most part, I let IPF control the flow of panels and did not use GOTO numbers. Stepping through IPF's sequencing was an interesting learning experience that helped introduce me to the logical grouping of these tasks. However, it also controlled how I worked at a task.

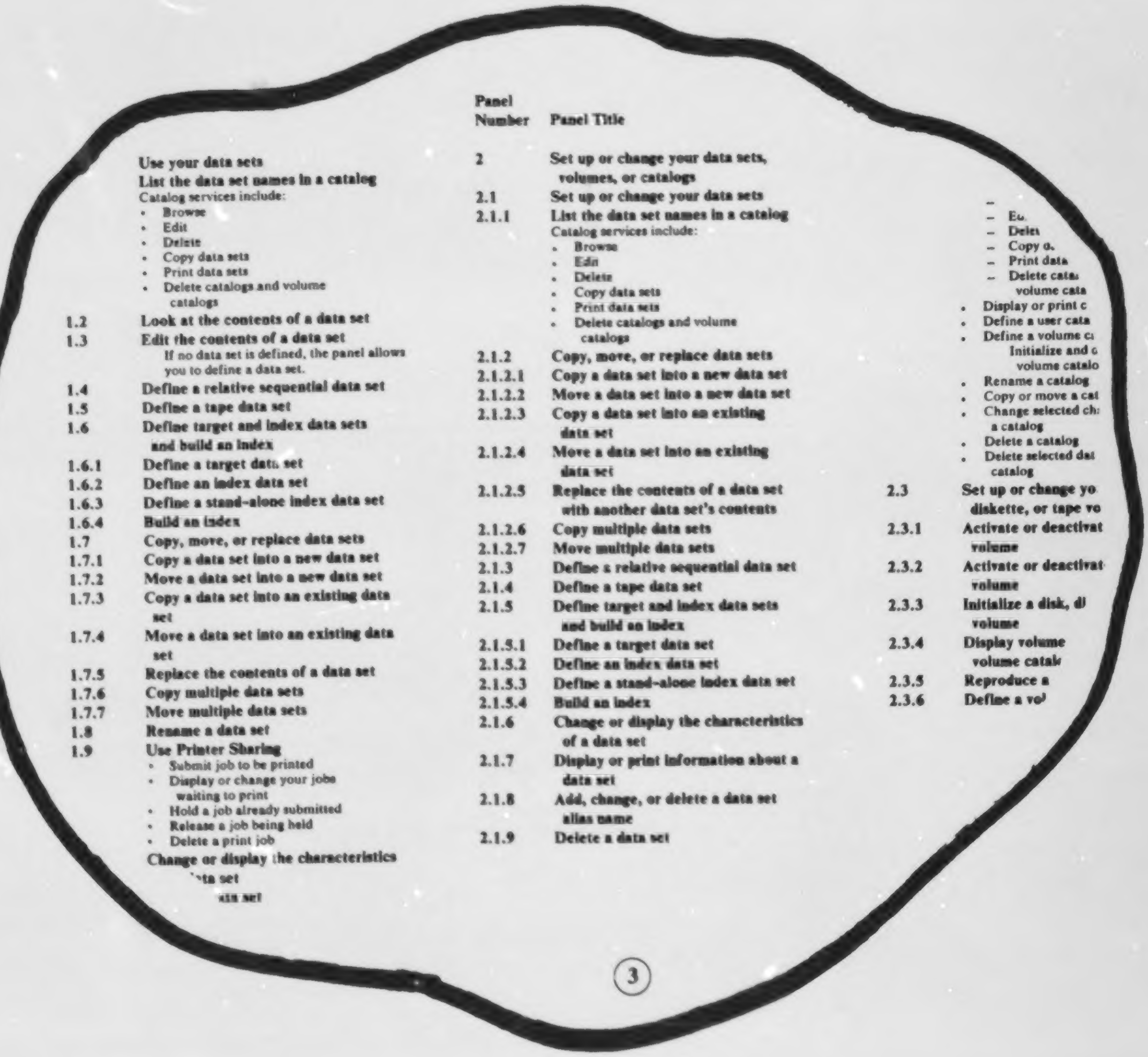
But, as I became familiar with IPF, the learning phase was being usurped by the doing phase. I had to use IPF to do some work. Each time I wanted to edit a data set, I looked at the *IPF Reference Card* under "Use Your Data Sets" and traced down the list of task names and then got the number. Soon I remembered it was "one point something" and guessed. Obviously, in a few days of repeated use, I would learn the most frequently used GOTO numbers.

But, learning all of them would be unlikely. And, anyway, shouldn't the documentation help with this learning?

There had to be a better way to present this information for both the casual user and the user of many panels.

For these users, putting the panels in numerical order was putting the cart before the horse. The GOTO number was what they needed to know, not what they knew. They wanted to look up their tasks and find the appropriate GOTO number.

So, starting with the list as it appeared on the *IPF Reference Card*, I moved the numbers after the task name and then sorted the list alphabetically. Then, because it was geared to an "end user," I deleted references to some tasks suited to specialists—for example, installing new hardware. I circulated the tentative list among information and system developers for review. Vocabulary was made consistent and concise.



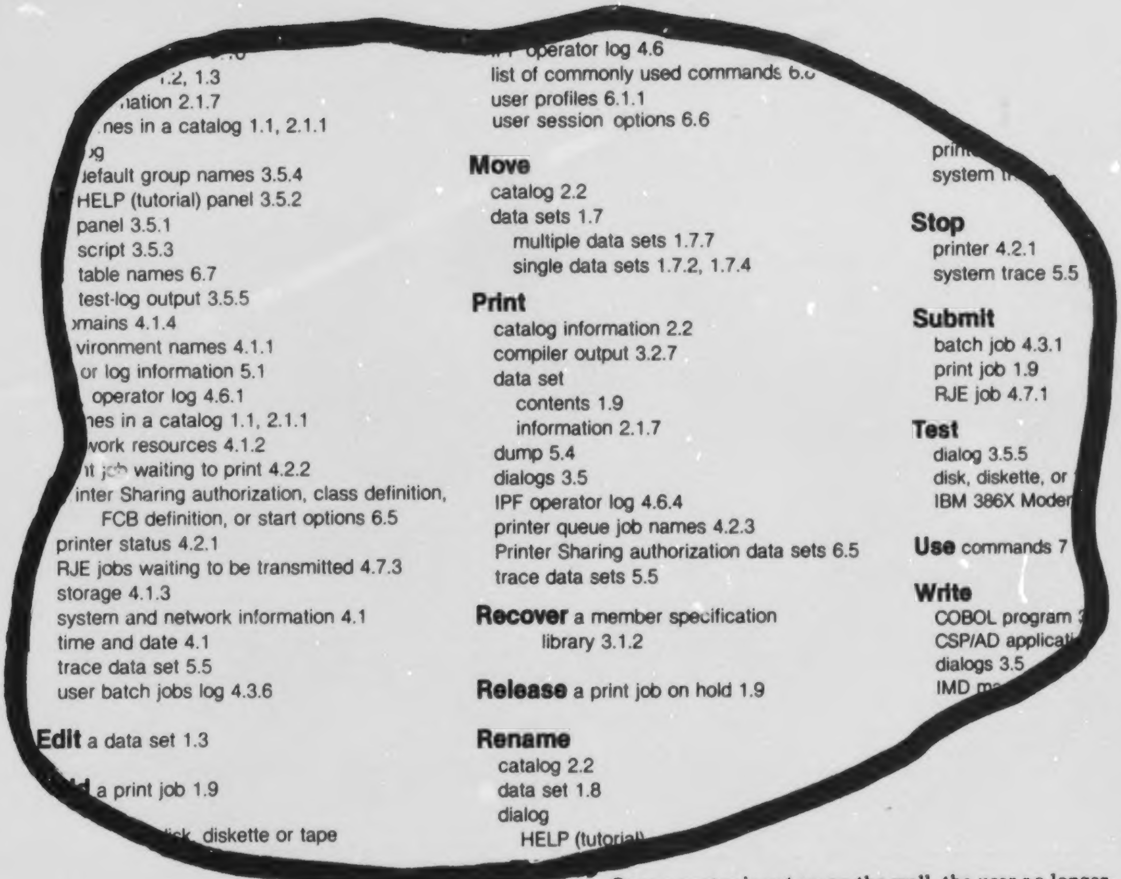
	Use your data sets
	List the data set names in a catalog
	Catalog services include: • Browse • Edit • Delete • Copy data sets • Print data sets • Delete catalogs and volume catalogs
1.2	**Look at the contents of a data set**
1.3	**Edit the contents of a data set** If no data set is defined, the panel allows you to define a data set.
1.4	**Define a relative sequential data set**
1.5	**Define a tape data set**
1.6	**Define target and index data sets and build an index**
1.6.1	**Define a target data set**
1.6.2	**Define an index data set**
1.6.3	**Define a stand-alone index data set**
1.6.4	**Build an index**
1.7	**Copy, move, or replace data sets**
1.7.1	**Copy a data set into a new data set**
1.7.2	**Move a data set into a new data set**
1.7.3	**Copy a data set into an existing data set**
1.7.4	**Move a data set into an existing data set**
1.7.5	**Replace the contents of a data set**
1.7.6	**Copy multiple data sets**
1.7.7	**Move multiple data sets**
1.8	**Rename a data set**
1.9	**Use Printer Sharing** • Submit job to be printed • Display or change your jobs waiting to print • Hold a job already submitted • Release a job being held • Delete a print job
	Change or display the characteristics
	ta set
	ata set

Panel Number	Panel Title
2	**Set up or change your data sets, volumes, or catalogs**
2.1	**Set up or change your data sets**
2.1.1	**List the data set names in a catalog** Catalog services include: • Browse • Edit • Delete • Copy data sets • Print data sets • Delete catalogs and volume catalogs
2.1.2	**Copy, move, or replace data sets**
2.1.2.1	**Copy a data set into a new data set**
2.1.2.2	**Move a data set into a new data set**
2.1.2.3	**Copy a data set into an existing data set**
2.1.2.4	**Move a data set into an existing data set**
2.1.2.5	**Replace the contents of a data set with another data set's contents**
2.1.2.6	**Copy multiple data sets**
2.1.2.7	**Move multiple data sets**
2.1.3	**Define a relative sequential data set**
2.1.4	**Define a tape data set**
2.1.5	**Define target and index data sets and build an index**
2.1.5.1	**Define a target data set**
2.1.5.2	**Define an index data set**
2.1.5.3	**Define a stand-alone index data set**
2.1.5.4	**Build an index**
2.1.6	**Change or display the characteristics of a data set**
2.1.7	**Display or print information about a data set**
2.1.8	**Add, change, or delete a data set alias name**
2.1.9	**Delete a data set**

	– – E – Delet – Copy d – Print data – Delete cata volume cata • Display or print c • Define a user cata • Define a volume c Initialize and c volume catalo • Rename a catalog • Copy or move a cat • Change selected ch a catalog • Delete a catalog • Delete selected dat catalog
2.3	**Set up or change yo diskette, or tape vo**
2.3.1	**Activate or deactivat volume**
2.3.2	**Activate or deactivat volume**
2.3.3	**Initialize a disk, di volume**
2.3.4	**Display volume volume catal**
2.3.5	**Reproduce a**
2.3.6	**Define a vo**

③

Figure 3. Sample from the IPF Reference Card (slightly reduced)



.2, 1.3
nation 2.1.7
nes in a catalog 1.1, 2.1.1
g
default group names 3.5.4
HELP (tutorial) panel 3.5.2
panel 3.5.1
script 3.5.3
table names 6.7
test-log output 3.5.5
mains 4.1.4
vironment names 4.1.1
or log information 5.1
operator log 4.6.1
nes in a catalog 1.1, 2.1.1
work resources 4.1.2
nt job waiting to print 4.2.2
inter Sharing authorization, class definition,
FCB definition, or start options 6.5
printer status 4.2.1
RJE jobs waiting to be transmitted 4.7.3
storage 4.1.3
system and network information 4.1
time and date 4.1
trace data set 5.5
user batch jobs log 4.3.6

Edit a data set 1.3

a print job 1.9

isk, diskette or tape

operator log 4.6
list of commonly used commands 6.
user profiles 6.1.1
user session options 6.6

Move
catalog 2.2
data sets 1.7
multiple data sets 1.7.7
single data sets 1.7.2, 1.7.4

Print
catalog information 2.2
compiler output 3.2.7
data set
contents 1.9
information 2.1.7
dump 5.4
dialogs 3.5
IPF operator log 4.6.4
printer queue job names 4.2.3
Printer Sharing authorization data sets 6.5
trace data sets 5.5

Recover a member specification
library 3.1.2

Release a print job on hold 1.9

Rename
catalog 2.2
data set 1.8
dialog
HELP (tutorial)

prin
system

Stop
printer 4.2.1
system trace 5.5

Submit
batch job 4.3.1
print job 1.9
RJE job 4.7.1

Test
dialog 3.5.5
disk, diskette, or
IBM 386X Moder

Use commands 7

Write
COBOL program
CSP/AD applica
dialogs 3.5
IMD m

Figure 4. Sample from the IPF Poster (Reduced approximately 50 percent)

The final list, the user's guide, was published as a 25-by-38-inch poster. See Figure 4 for a sample of the *IPF Poster*. It's easy-to-read, inviting, and task-oriented in a way quite different from the *IPF Reference Card*. However, even this form has both advantages and disadvantages.

The Advantages:

A well-designed, attractive poster that documents a user interface bridges the gap between pure marketing information and pure technical information. It attracts the customer to what is important about a product and what the marketing strategists want the customer to know about that product.

This one information unit, though perhaps more expensive than some other forms of information, can serve more than one user simultaneously.

A poster gets frequently used information off the desk surface, where users have "today's" work. The poster is less likely to become lost in a pile of papers.

Once a poster is put up on the wall, the user no longer has to fumble finding the information within a card, book or binder. Often a user can't remember where in a book or set of books a particular piece of information is and will simply not go through the exercise (chore) of re-searching the information no matter how helpful that information would be—the old "I know it's in here somewhere, but I don't have time to find it now" problem.

The Disadvantages:

A poster is more expensive than a few pages in a book or similar form of information. Some customers have a "clean wall" policy, which prevents them from posting anything on the work area walls. (To solve this problem, perhaps the poster could be produced in a smaller version.) Special production, storage, and distribution plans usually have to be made to handle anything "different" from what is standard.

Conclusion

There are probably still other forms that this same information could take to present IPF in a task-oriented way for another audience in another environment with another goal. Both the *IPF Reference Card* and the *IPF Poster* have been well-received by our customers.

Resumes for Technical Communicators

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ABSTRACT

The calling card of the technical communicator looking for a position is his/her resume. This resume — written thoughtfully and well, laid out in clear, concise, complete fashion, and printed on quality paper — should encompass facets of the technical communicator's communicative ability. The professional competence, concern for detail, use of tight, descriptive, accurate language, the selectivity shown in knowing what to leave out — all should be evident in the finished product. Regrettably, more often than not, the technical communicator commits the same miscalculations, oversights, and infractions as his/her less language-oriented fellow job-seekers. This workshop poses common problems, offers a responsible, reliable, logical way to avoid them, and suggests some of the alternatives open to the job-seeker in technical communication.

HOT? COLD? OR LUKEWARM? HOW DOES YOUR RESUME LOOK?

In the course of a career in technical communication, the average technical communicator will change jobs at least four or five times. In the process, each will find it necessary to recreate their working lives on paper in the form of a professional resume for each new position sought. How does the average technical communicator go about doing this?

In a word, badly.

Badly, because somehow the technical communicator seems unable to recognize just what it is he or she is selling in a resume. Education? Experience? Accomplishments? Hobbies? Or just a pleasant personality sans any of the above?

Considerable room exists for improvement in the art of researching, analyzing, determining, and ultimately selecting that information most relevant to a technical communicator's resume. The key word here is "communicate."

WHY HAVE A RESUME?

Employers in general expect professional people to have one. More importantly, however, is your own need to know what you have done, where and when you did it, and what value it served you. A third reason, valid but optional, is the ability to quickly and succinctly present your credentials to a prospective employer when requested. In effect, a resume becomes an important even key tool in the communicator's tool kit.

WHAT SHOULD A GOOD RESUME CONTAIN?

An employer appreciates telling him right away what it is you are seeking; the OBJECTIVE seems the likeliest place to tell him what it is you are, do, or have done. Next, ACCOMPLISHMENTS should state those things you are proudest of and offer as indications of your true worth. At this point, an option presents itself: if you choose to do so, a PERSONAL PROFILE can list briefly those characteristics you feel best exemplify your own temperament and personality. This requires truly subjective writing; it is often the most difficult for a resume writer to create.

EXPERIENCE is next best but here the trick is not what to put in, but what to leave out. Too much detail is a turnoff; too little detail leaves an employer wondering just what you did do. EDUCATION logically follows experience unless you are a recent college grad, in which case it is advisable to show the currency of your degree and the course of study you pursued. Personal data comes next — but not height, weight, age, sex, or marital status. None of these really earns you points with reference to "what can you do for us?" However, your health condition (preferably "Excellent") and your social security number can be useful if supplied. And if you have a security clearance, this is as good a place as any to put it.

Two "Negotiables" should always appear on your resume. The first is AVAILABILITY, the second is SALARY. Avoid stating anything too specific here, unless pressed by an employer. Let the interview be the time and place for both of these to be discussed.

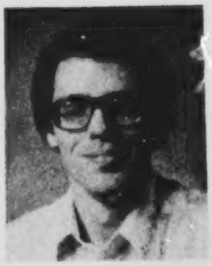
HOW TO DEVELOP A GOOD RESUME

In this workshop, each element will be developed in further detail, with a discussion of the pros and cons for technical communicators of all types.

Among the crucial questions to be discussed and answered in this workshop are these: what is the real purpose of a resume; what does an employer really look for; what to leave out of a resume; what are the optional elements of a resume; what are the most common mistakes made by resume writers; and does the best candidate or the best resume get the job. In addition, how to determine your strengths and weaknesses is shown by a simple demonstration, as well as how to determine where you are at present in your career. Attendees will actively participate in answering these questions and in creating their own resumes, composing and reviewing those elements assigned during the workshop.

High Tech/High Touch Writing and Editing

W. Tim Meiers, Moderator



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Picture this: A writer/editor is busy. Machines are scattered about the work place making life easier. A word processor processes, a printer prints, and a plotter plots. But before long, the writer/editor begins to sigh, repeatedly. Finally, the writer/editor wanders around in search of some chitchat with a fellow worker.

Several influences could have prompted the writer/editor to seek some human company: loneliness, boredom, friendship, technology. Technology?

John Naisbitt, in his book Megatrends, labels one of the trends currently changing our whole society as "High Tech/High Touch." It means that humans will balance high technology with high touch, a human response to technology.

As a technical communicator, you are probably surrounded by automation. Does your response to it, your human response, affect how you communicate? Our panel believes so. We invite you to an interactive session on high-touch writing and editing.

Patrick M. Kelley traces the trend of high tech/high touch in recent Proceedings of the International Technical Communication Conferences. His paper, "High Tech/High Touch: A New Trend in Technical Writing and Editing," explains Naisbitt's use of content analysis to determine trends. Applying content analysis to the field of technical writing leads Kelley to believe that our profession is moving toward a high-touch response to technology.

Louise M. Vest feels that the human response to technology will redefine a familiar organizational concept--the team. Her paper, "The Team: One Approach to Human-Centered Technology," discusses teams becoming more dialogic, interactive, and cooperative. Technical communicators, those who bridge the distance between the human and the machine, can provide the team approach to achieve high touch in a high-tech world.

Mary S. Hageman explains the concepts of system, team, and dialogue to tie together scientific research and scientific writing. She views a scientific project as a system that includes the process of report writing. Hageman's paper, "Integrating Scientific Research and Scientific Writing: The Researcher-Editor Team," examines several high-touch ways to prevent conflicts between the scientist and the technical editor.

The relationship between writers and editors readily lends itself to a discussion of "High Tech/High Touch." Barbara Y. Myers conducted an extensive literature review of author-editor relationships in technical writing. She finds three types of relationships: editor-centered, author-center, and team-centered. Interestingly, the types do not group chronologically. Myers' paper is "A Classification of Author-Editor Relationships: Toward Team-Centered Relationships."

R. L. "Buck" Sims rounds out the panel. His paper, "Advantages of Dialogue From a Management Perspective," presents the concept of editorial dialogue. This concept offers managers some pointers on how to participate dialogically in the writing and editing process. What they gain from applying editorial dialogue can reinforce other high-touch management practices such as job enrichment programs and quality circles.

High Tech/High Touch: A Trend in Technical Writing and Editing

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High tech/high touch, one of the ten trends of John Naisbitt's Megatrends, is explained as the trend toward counterbalancing high technology with high touch, a human response to technology. High tech/high touch is identified as a trend in technical communication through content analysis of recent Proceedings of the International Technical Communication Conferences (ITCCs). Papers from the 28th, 29th, and 30th ITCCs are reviewed to identify the trend toward high tech/high touch in both technical writing and technical editing.

INTRODUCTION

In Megatrends: Ten New Directions Transforming Our Lives, John Naisbitt (1) examines ten trends that are changing the nature of American society. All ten of these trends are of interest to us as technical communicators within that society:

1. Industrial Society → Information Society
2. Forced Technology → High Tech/High Touch
3. National Economy → World Economy
4. Short Term → Long Term
5. Centralization → Decentralization
6. Institutional Help → Self Help
7. Representative Democracy → Participatory Democracy
8. Hierarchies → Networking
9. North → South
10. Either/Or → Multiple Options

Of special interest to all of us as technical communicators is the first trend: the transformation of American society during the past thirty years from an industrial society to an information society. That transformation, which parallels the rise of our profession during the past thirty years, explains our new prominence as a profession.

THE TREND TOWARD HIGH TECH/HIGH TOUCH

Of special interest to me, to the technical communicators with whom I have worked closely for the past three years, and perhaps to you since you are reading this paper is the second trend: the trend toward counterbalancing high technology with high touch, a human response to technology. According to Naisbitt, this trend is essentially formulaic. "High tech/high touch is a formula," he states, "to describe the way we have responded to technology. What happens is that whenever new technology is introduced into society, there must be a counterbalancing human response--that is, high touch--or the technology is rejected. The more high tech, the more high touch."

As Naisbitt himself suggests with his examples, we have responded to high tech with high touch, literally responding from birth to death. Our hospitals, for example, have become institutions of high technology. We have responded by becoming interested in home births. Our hospitals have become institutions that house life-supporting high technology, machines that sustain life interminably. We have responded by becoming interested in hospices, homes where humans sustain us while we die.

Between birth and death in our high-tech society, we have come to value the balance of high tech/high touch. As Naisbitt suggests, the great appeal of the Star Wars trilogy indicates that it is, to a great extent, a manifestation of the values of our culture. The trilogy, as you know well, portrays a contest between the forces of the Empire, which are dominated by technology, and the Rebels, who balance high tech with high touch. The forces of the Empire, as implacable as their Death Star, are utterly without human responses--or at least they are utterly without any of the redeeming human responses. The Rebels, in contrast, love and sorrow and cling tenaciously to honor as they blast into hyperspace in the Millennium Falcon. Again as Naisbitt suggests, the Rebels are not anti-technology. Luke Skywalker, Princess Leia, and Han Solo--we know them so well that they are part of us--balance high tech with high touch. And the Force is with them.

Naisbitt identified the trend toward high tech/high touch through content analysis, the method by which he identified all ten of the megatrends. Content analysis is a method for obtaining information on a nation through an analysis over time of the changing content of its newspapers.

The method was used successfully by the Allies during World War II to obtain information on Nazi Germany. Led in the project by Paul Lazarsfeld and Harold Lasswell, who were both later to become well-known communication theorists, the Allies were able to gain valuable information about the German economy, even though this information was "secret," through an analysis over time of local German newspapers for stories on factory openings, production targets, and factory closings and for notices of train schedules, including departures, arrivals, and delays. From such local information, the Allies were able to gain information on the larger economic situation in Germany. Similarly, from lists in local newspapers of the names of local soldiers and sailors who had been killed or wounded in action, they were able to gain information on the total casualties of the German military forces.

Content analysis was so successful, in fact, at gaining information on Germany that the Allies began to analyze the changing content of local newspapers in Imperial Japan. And today, according to Naisbitt, United States intelligence agencies spend millions of dollars annually on content analysis in various strategic areas of the world.

Naisbitt and his colleagues--the Naisbitt Group--claim to be the first, however, to analyze over time the changing content of local newspapers in the United States to study our own society. They are as confident in the method as were the Allies during World War II because it operates according to the principle of forced choice in a closed system.

As Naisbitt explains: ". . . the *news hole* in a newspaper is a closed system. For economic reasons, the amount of space . . . [for] news in a newspaper does not change significantly over time. So, when something new is introduced, something else or a combination of things must be omitted. You cannot add unless you subtract. It is the principle of forced choice in a closed system.

"In this forced-choice situation, societies add new pre-occupations and forget old ones. In keeping track of the ones that are added and the ones that are given up, we are in a sense measuring the changing *share of the market* that competing societal concerns command."

In analyzing over time 6,000 local newspapers in the United States, Naisbitt and his colleagues have seen the news hole for discrimination, for instance, filled with concern about racism during the 1960s, then with concern about sexism in the early 1970s, and then with concern about ageism in the late 1970s. At the crest of societal concern about ageism, Congress outlawed mandatory retirement in the public sector and extended the age for retirement from 65 to 70 in the private sector. Since then, Naisbitt has seen concern about ageism decrease.

As another instance, Naisbitt has seen societal concern about drug use and abuse increase and decrease. He states: "If all the local news space devoted to drug use and abuse during the year 1970 were equated to 100, the amount of space devoted to that subject during the year 1979 dropped to 8, although it has risen since."

Through content analysis, then, Naisbitt identified the ten trends that he examines in *Megatrends*, including the trend toward high tech/high touch. If he had used content analysis not on newspapers but on the literature of technical communication, he would have identified the same trend toward high tech/high touch. In fact, if he had used content analysis on recent *Proceedings* of the International Technical Communication Conferences (ITCCs), he would have identified the same trend.

In the remainder of this paper, I review papers from the 28th, 29th, and 30th ITCCs to identify the trend in technical communication toward high tech/high touch--toward counterbalancing high technology with high touch, a human response to technology. A precursor of this trend is a paper from the 25th ITCC, "Technical Communication and the Changing Conception of Communication," in which I (2) trace the changing conception of communication from mechanistic concepts through behavioristic concepts to humanistic concepts. The trend is apparent now in technical communication, including both technical writing and technical editing.

HIGH TECH/HIGH TOUCH IN TECHNICAL WRITING

In a paper from the 29th ITCC, "Charting a New Course for Technical Writing and Editing: Technical Writing and Editing as Dialogue," I (3) begin to chart a new course for technical writing that guides our profession toward technical writing as dialogue. *Dialogue*, as Martin Buber uses the term in philosophy and as Carl R. Rogers uses the term in psychology, is the intense empathy of one person for another. *Dialogue*, as I use the term in the paper, is the intense empathy of the technical writer for the reader. Because dialogue is Buber's I-Thou attitude in action--and because tone is the expression of the writer's attitude toward the subject and the reader--dialogue is especially applicable to tone in technical writing. In the paper, I provide six guidelines for the practice of technical writing as dialogue so that high-tech writing and reading are counterbalanced by high touch.

In a related paper from the 29th ITCC, "Toning Up Those Ditchwater Yah-Da's: Writing as Dialogue," W. Tim Meiers (4) urges the technical writer to write dialogically. He urges the writer to "speak" to the reader through tone. In effect, he urges the writer to write a high-tech manual with a counterbalancing high touch. As an illustration of a model dialogic manual, he cites and quotes from *How to Keep Your Volkswagen Alive* by Richard Sealey. Significantly, in terms of the trend in technical writing toward high tech/high touch, Sealey's manual won the award for Best of Show in technical publications at the 28th ITCC.

And in another paper from the 29th ITCC, "Improving the Friendliness of Technical Manuals," Linda Stout Chavarria (5) links the user-friendly movement to the trend toward high tech/high touch. However, she dismisses some of the writing from the user-friendly movement, writing in which the "friendliness" is only style, not substance. Such writing is monologic instead of dialogic, manipulative instead of empathic. Dialogic writing, in contrast, is not only style, but also substance. It is the manifestation through tone of the writer's intense empathy for the reader. As such, it is high touch.

Shifting from tone to voice, James S. Euler (6) in a paper from the 30th ITCC, "The Voice of the Technical Writer," urges the technical writer to recognize three different relationships with the reader and to write in the three different voices that are appropriate for these three relationships. As Euler explains, the technical writer as transmitter transmits information at one level to the reader at the same level; the technical writer as translator translates information at one level for the reader at a different level; and the technical writer as author creates information at any level for the reader at any level. Three different voices are appropriate for the three different relationships. If the relationships are high touch, however, the three voices are the same in one respect. They are all *human* voices--human voices that counterbalance high tech with high touch.

HIGH TECH/HIGH TOUCH IN TECHNICAL EDITING

In the same paper from the 29th ITCC in which I begin to chart a new course for technical writing, I (7) also begin to chart a new course for technical editing that guides our profession toward technical editing as dialogue. Dialogue, again as Buber and Rogers use the term in philosophy and pyschology, is the intense empathy of one person for another. And dialogue, as I use the term in the case of technical editing, is the intense empathy of the technical editor for the technical writer. In the paper, I refer to six guidelines for the practice of technical editing as dialogue so that high-tech writing and editing are counterbalanced by high touch.

In an earlier paper from the 28th ITCC, "Editorial Dialogue: An Alternative Writer-Editor Relationship," Mary S. Hageman, Louise M. Vest, and I (8) provide the guidelines to which I refer in the paper from the 29th ITCC. Acknowledging the adversarial relationship that customarily exists between the writer and the editor, we propose editorial dialogue as the basis for an alternative writer-editor relationship--a caring, supportive human relationship that counterbalances high tech with high touch. With our six guidelines, we provide the technical editor with a basis for practicing high-touch editing.

In a related paper from the 29th ITCC, "Developing an Alternative Writer-Editor Relationship: A Workshop in Editorial Dialogue," Vest and Hageman (9) describe an in-house workshop in which they teach the technical writer and the technical editor to work together dialogically. Emphasizing role-mirroring, their workshop is designed to develop mutual empathy between the writer and the editor. And as it encourages the development of the writer's intense empathy for the editor and the editor's intense empathy for the writer, the workshop encourages a high-touch writer-editor relationship.

Finally, in a paper from the 30th ITCC, "Dialogue: The Key to Professionalism in Technical Communication," R. L. "Buck" Sims (10) summarizes his experience with Vest and Hageman's editorial dialogue. On the basis of his experience as the only technical editor for 100 scientists and engineers at a government research laboratory, he concludes that editorial dialogue, a human relationship of high quality, is the key to the production of technical documents of high quality. In other words, he concludes that the key to high quality in high-tech writing and editing is high touch.

CONCLUSION

In this paper, I review papers from the 28th, 29th, and 30th ITCCs to identify the trend in both technical writing and technical editing toward high tech/high touch. My review is limited to my own papers and the papers of technical communicators with whom I have worked closely for the past three years. But even a review that is limited to the papers of these trendsetters identifies the trend in technical writing and editing toward high tech/high touch.

A full review of the recent Proceedings--a full content analysis--would identify the full extent of the trend. That review I reserve for another paper. The trend, though, seems so extensive that I might need the assistance of John Naisbitt himself and the full Naisbitt Group to write the paper.

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Toward Human-Centered Technology: '...A Sense of Obligation'

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Although few, if any of us, would willingly abandon the new technology, a dilemma exists: the desire to live securely on a healthier planet versus the fear of a heightened isolation for the humans involved in the technological revolution. Possible solutions for achieving a human-centered technology include: 1) recognizing the obligation to balance high tech with what John Naisbitt calls "high touch," 2) being willing to restructure our organizations and institutions—from hierarchies to functional systems management designs, and 3) learning to interact and interrelate in teams—cooperatively rather than competitively.

> A man said to the Universe:
> "Sir, I exist!"
> "However," replied the Universe
> "The fact has not created in me
> A sense of obligation."
> Stephen Crane

Although the poet wrote these words nearly a century ago, they express the feelings of many today who feel resistance, even hostility, to the newest emerging revolution--high technology. This revolution seems to be developing without concern for the humans in its path--on a collision course with many of the old values and traditions, unyielding to resistance, insensitive to human needs, feeling "no sense of obligation" to human existence.

THE DILEMMA

Few, if any of us, would willingly abandon the new technology, however--no matter how fearful we are of it. In this time of diminishing resources, polluted air and water, and worldwide economic hardship, our advancing technology promises a new prosperity with clean industry and increased ease in living. Wariness of the side effects of this technology may be valid, however. Nuclear plants that promise abundant, inexpensive energy are proving to be more dangerous than we had thought; machines intended initially to relieve the humans' burden are all too often doing the jobs once held by these humans; new scientific developments that could be used to benefit people are being perceived by some as threats to world survival. And so there is a dilemma: the desire to live securely on a healthier planet versus the fear of heightened isolation for the humans involved.

THREE POSSIBLE SOLUTIONS

Solving this dilemma may be as simple as the recognition of a "sense of obligation" to human existence. The obligation exists. It exists within the humans who create and benefit from a technology that promises so much. To respond to this obligation, we must start from the beginning--with children in our schools, with peers in our organizations, and with co-workers and superiors in our places of work--to establish responsive and responsible relationships to counter the mechanized society. For the purpose of this paper, however, we shall focus on working relationships because the initial impact of the technological revolution will be felt in the workplace.

To achieve a healthy relationship, then, between process and product--the humans who create, develop, and operate the machine and the machine itself--we must:

- Recognize the obligation to balance high tech with what John Naisbitt calls "high touch"--an expanded awareness of the fact that the human is a social being and must have meaningful opportunities to interact and interrelate with other caring humans;
- Be willing to restructure our organizations and institutions--from hierarchies to systems management designs;
- Learn to interact and interrelate as teams--cooperatively rather than competitively.

High Tech/High Touch

As technical communicators, we have a special opportunity to begin achieving a balance between high tech and high touch. By the very nature of our jobs, we are especially aware of the fragile relationship between the world of the machine and the world of the human. We know how essential our technology is to increasing the quality of life on the planet. And we are in the position of helping to develop quality relationships in the workplace that will produce a human-centered technology.

Naisbitt asserts that "...whenever new technology is introduced into society, there must be a counterbalancing human response--that is, high touch--or the technology is rejected." He assures us that people will eventually demand quality relationships in their lives. If he is correct, and the history of human experience would suggest that he is, then we must begin to respond to this need before it becomes a hostile reaction to an unnecessary sense of futility.

From Hierarchies To Systems

Modern theorists of the stature of Fritjof Capra (2), Buckminster Fuller (3), Gregory Bateson (4), and Carl Rogers (5) have been encouraging reevaluation of those organizational structures in this society that have led to our present serious social and ecological conditions. Additionally, they have been calling for changes in our management practices--from the rigid hierarchial design: first-last, win-lose, boss-worker--to a flexible systems approach. Society is now faced with the challenge of reassessing the human's role in an increasingly machine-dominated environment. In the wake of what is often perceived to be runaway technology, human beings sometimes see themselves at the mercy of the machine that they have created.

Those theorists point out, however, that what has always existed in reality is the ecosystem--an interrelationship of all life. Hierarchies are structures that have been superimposed on this interrelating system. Specifically, for the purpose of defining this concept for the workplace, a system is an integration of elements, of components, and of people, all working together to accomplish some objective. Conversely, a hierarchy is a structure that limits communication and encourages a competitive atmosphere among those who are responsible for completing some objective or task. A hierarchy generally manifests itself as one of two types; either the hierarchy is benign (paternalistic), or it is malignant (autocratic).

A benign hierarchy retains power at the top of the structure but allows some room for input and feedback, such as advisory groups and boards of appeal. One of the best examples of the benign type is one army-operated research laboratory located in the Southwest. The lab is directed by a senior army officer and staffed in part by military personnel. The scientists, engineers, and many of the support staff are civilians. A climate exists within the lab, however, that encourages respect and cooperation among the military and civilian employees. These attitudes are promulgated from the top so could change when a new director takes over.

In a malignant hierarchy, there is little freedom from management, no accepted procedure for disagreement, and no method for appeal against wrongful actions and/or harassment. One such institution frankly and rather proudly announces that within its organization "loyalty up" is the standard operating procedure for management-employee relationships. Consequently, there is no open communication, no mutual peer support, no professional pride in the accomplishments of colleagues. The rank and file within the organization are suspicious of their superiors and of one another, and their stressful working environment is affecting their health and wellbeing. In fact, the health insurance rates for that organization nearly doubled in one year because of the unusually high medical costs incurred by employees in a 12-month period.

In contrast, the systems approach to management reflects an understanding that all humans within that system or organization are participants in the functions of the organization. Capra, in The Turning Point, defines the concept further:

> ...Systems are wholes whose specific structures arise from the interactions and interdependence of their parts. The activity of systems involves a process known as transaction--the simultaneous and mutually interdependent interaction between multiple components.

Capra's transaction is the process for transcending from a hierarchial organization into a systems approach to living and working. Transaction--or teamwork--is the application of interpersonal skills that encourage humans to work together effectively, networking their developing teams within an organization and thereby enabling that organization to transform into a system. As Capra emphasizes: "Systems thinking is process thinking." With the team, human involvement in the workplace evolves into dynamic relationship and the technology itself can be seen for what it really is--the fruits of human creativity and effort. High touch. The technology becomes human-centered.

The Team: Dialogic, Interactive, Cooperative

To achieve an understanding of the systems approach and to function effectively within this organizational design, we can begin simply by rediscovering and, perhaps redefining, the concept of the team. A team is comprised of individuals who come together as equals, without hidden agendas, to work on a given assignment or project. They interact as responsible professionals who know that to establish a psychologically positive climate is paramount to a successful, satisfying work situation. They share the rewards and accomplishments, the problems and frustrations, the interesting aspects and the tiresome minutiae and aggravating details of the entire project and experience. Because it calls for the best efforts of every member, the team is the strongest of human organizations (6).

Dialogue. Carl Rogers, drawing from the work of Capra and other such diverse 20th Century theorists as philosopher, Martin Buber and psychiatrist, Carl Jung, supports the emerging theory of dialogic communication as a method for creating responsible professional relationships. Rogers emphasizes three concepts of dialogue: genuiness, unconditional positive regard, and empathic understanding. In any relationship--even professional, work-related ones--persons who are honest, who are respectful of the humanity of others, and who are attentive to the ideas, opinions, and feelings of co-workers are consciously part of a process that will establish that special balance between high tech and high touch.

Although the "Father of Dialogue", Martin Buber, believed that the ability to be dialogic was innate--either one was inherently dialogic or inherently monologic--Rogers and others (7, 8, 9) believe that humans can learn to communicate dialogically by learning new ways in which to relate.

Interaction. Members of a team interact. They cannot function independently from one another and expect unity and coherence in their efforts. The team concept requires alternative organizational strategies. For example, a team leader is not the counter part to a committee chairperson who often is in control of the direction--even the goals--of the entire committee. Rather, the team leader is an integral part of the team with the specific function of coordinating (not delegating) responsibilities and carrying out administrative tasks with cooperative support from other team members.

Some companies are already moving toward a team concept--although not always consciously. Wherever there is a positive climate established, however, the practice of the team seems to emerge--even if the theory is absent. Most humans gravitate toward situations that allow them to contribute in a creative and psychologically secure environment.

Cooperation. For too long, a false idea of competition--getting ahead no matter what the cost--has been fostered in this society. To cooperate is often viewed as "giving the other guy the edge" as we race toward success. Consequently, valuable time, creative ideas, and effective results are often wasted or lost. The Japanese are making a commercial success of their cooperative practices on all levels of their business community. They are sharing the rewards of their successes and shouldering the responsibilities of their failures equally in their organizational design for achieving national prosperity.

Team members cooperate rather than compete with one another because they understand that to achieve a result, a process must take place. To be an integral part of a dynamic, evolving process eliminates competition. Each individual talent and function is seen as equally important since processes tend to be cyclical, requiring team members to interact regularly as assignments overlap, unexpected problems occur, and deadlines approach.

CONCLUSION

Quality working relationships--high touch even in the most high tech situation--are essential to a successful, evolving process that will produce desirable outcomes. Capra emphasizes the importance of relationship to a technological society:

> The shift from objects to relationships has far-reaching implications for science as a whole. Gregory Bateson even argued that relationships should be used as a basis for *all* definitions, and that this should be taught to our children in elementary school. Anything, he believed, should be defined not by what it is in itself, but by its relations to other things.

Capra, a physicist, and Bateson, an anthropologist, are describing views in science that are shifting from seeking to break everything into "independently existing smallest units" to seeing the world as a "complicated web of relations between the various parts of a unified whole." Capra goes on to include the "human observer" in this unified whole. As human observers, we have the opportunity to participate in our own unified whole as we link with others through dialogic processes of communication. From and through this communication will come the meaningful human relationships that Naisbitt describes, that Rogers defines, and that Capra emphasizes. Only then will we achieve a human-centered technology.

Once we recognize that we can, in fact, encourage our co-workers and supervisors to join with us in a constructive team approach to effect increased human communication in the workplace, we become facilitators of high touch in high tech. As conscious links between the human and the machine, we can support that dynamic balance that will usher in the age of human-centered technology. And to the poet we can finally say: The fact has indeed created in us a sense of obligation.

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High Touch in the Workplace: Integrating Scientific Research and Scientific Writing

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Scientific researchers often find that writing reports on their work is a boring and sometimes painful task. We look at the entire structure of a scientific research unit as a system in which each person is working at a task whose relationship is clearly defined relative to the whole system as well as to each of its parts. By including technical writing and technical editing as tasks which are integral parts of that system, we teach scientists that writing can become less painful and, therefore, less frustrating and costly. We conduct a workshop that enables participants to experience team-centered and editor-centered sessions and to compare results of the two approaches.

INTRODUCTION

An attitude toward writing that is held by many scientists is aptly expressed by Mike McElroy, an atmospheric chemist at Harvard (1): "Once a scientific theory is all nicely wrapped up, then it's not interesting. It just involves the pain of writing." This "pain of writing" is not felt only by those scientists who do basic research. Workers in applied science and technology also find that communicating the results of their work is painful. The painfulness of writing for many scientists is time consuming, frustrating, and, thus, costly to their employers. By looking at the entire structure of a scientific research unit as a system in which each person is working at a task whose relationship is clearly defined relative to the whole system as well as to each of its parts--and by including technical writing and technical editing as tasks which are integral parts of that system--writing can become less painful and, therefore, less frustrating and costly.

THE TEAM

If a given scientific research unit is considered a system, then each worker in that system should be considered a member of a team whose goal is to complete a specific research project, interpret results, and communicate the meaning of the interpreted results to others. A team could include a manager, one or more researchers, a writer (who might be one or all of the researchers), an editor, a graphic artist, one or more typists, and a printer. Each member of the team should be equally responsible for the end product of the project and equally in charge of the project. In college technical writing classrooms, students are taught to work in teams when small groups of students are asked to produce reports. Because students are considered as equal individuals in the classroom, they readily adapt to the system approach to their project and divide easily into functioning teams whose members are equally in charge of and equally responsible for the outcome of their project. However, in the workplace, where most individuals have rank according to pay, seniority, education, or other criteria, workers need to be taught how to assume equality within the system. As technical writing/editing consultants, we teach workers to become equally in charge of and equally responsible for the outcome of their projects.

TRAINING FOR TEAMWORK

Whole-Team Meeting

We begin by calling all members of a team together to meet one another, learn the ultimate goals of the project, and describe their perceptions of their own and of one another's specific responsibilities. At this point, we deal with the time constraints and potential conflicts that we anticipate will prevent the team from completing the project efficiently.

Subteam Meeting

Once a project is under way, team members will automatically break into a variety of subteams based on immediate individual needs. In our workshops, we focus on the researcher-editor subteam. Following the whole-team meeting, we meet with the researchers and technical editors to discuss potential conflicts that members can anticipate based on their previous experience.

One such conflict, that between scientist and technical editor, is of critical importance to entire projects. Scientists' resistance to writing often causes them to delay that activity until the last possible moment, or even later, before a report is due. This, of course, frustrates editors, who cannot edit an unwritten manuscript and resent having to nag the scientist for his portion of the work. To avoid this conflict, we advise scientists and editors to discuss this issue candidly in that first meeting. By admitting that they hate to write and can use help doing so, writing-resistant scientists bring their needs to the editors, the very persons who can help solve the problem. We advise the scientists and editors to maintain contact after the initial meeting so that when a scientist becomes blocked, s/he and the editor can work together. The scientist can often talk through what s/he needs to say while the editor takes notes. The editor can then produce a rough draft of that portion of the document for the scientist to revise. This method prevents the painfulness of writing for the scientist and prevents needless delay of the finished product. If members of the team need practice in dialogic communication to make the above method work, we conduct a brief session in notetaking and/or role mirroring (2).

Other conflicts commonly arise among subteam members when a report is a product of multiple authors, a situation that can create special editing problems, including tension among the authors, awkward transition among multiple writing styles, difficulty in finding times when all authors can meet for editorial conference, and prevention of authors talking at cross purposes or overwhelming the editor by sheer force of number. One minor, but irritating, source of tension among authors can be eliminated by deciding upon the order that their names will appear on the final document before it is written. Thus, no unpleasant surprise awaits the author who writes his portion of the report and then is called away to another project. We modify the problem of disparate writing styles by asking each author to follow the guidelines on the Merck-Sigurdson Guide to Writing/Editing (2) throughout the writing stage, allowing all authors to work within the same parameters and giving the editor a point of reference when making editorial recommendations. We also suggest that the editor meet with weak writers separately to strengthen their drafts before all authors meet to review the entire report. Finally, we suggest that the group select one author to represent all of the authors in final conferences with the editor; however, difficulties can arise when the authors are unwilling to give up individual control of their drafts or when no one individual is willing to take the responsibility for representing the group.

The Researcher-Editor Encounter

In attempting to reintroduce Naisbitt's "high touch" into the "high tech" (3) world of scientific research and report writing, we teach scientists and editors to deal with one another dialogically by asking them to participate in a workshop that enables them to experience, in a non-threatening setting, feelings that cause problems in the often-harried settings of their professional environments. We arbitrarily assign our participants to groups of writers and groups of editors. The writers work up a draft based on information that we provide for them. While they write, we divide the group of editors into two subgroups and teach one subgroup how to conduct an editor-centered editing session. We teach the other subgroup how to conduct a team-centered editing session. Then we assign writers and editors to teams and ask them to edit the writing assignment. Following the editing session, we ask each person to quickly jot down the words that best describe his/her feelings about the session. We then lead discussion, allowing the participants to express their feelings and to evaluate the success or failure of the editing session. With few exceptions, those who participate in team-centered editing sessions express positive feelings, both in personal terms and in terms of the relative success of the editing session.

CONCLUSION

Using the concepts of dialogue, team, and system, we teach workers who are responsible for producing clear reports about their research to anticipate and prevent conflicts that would hinder them from completing a project efficiently. The dialogue/team/system approach fosters cooperative relationships among workers in all aspects of the report production process and helps those workers to complete a well-written report on time, while reducing the pain that so many scientists feel when faced with the task of writing up their rsearch.

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Advantages of Dialogue from a Management Perspective

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Comments following my presentation at the 30th International Technical Communication Conference indicated that some publications managers think editorial dialogue is a utopian theory that cannot work in the "real world." To expose the fallacy of such thinking, I examine in this paper the similarities that editorial dialogue shares with participatory leadership and job enrichment, two theories currently popular in human resources management.

BACKGROUND

Editorial dialogue has been the subject of papers (1, 2, 3, 4) and presentations at each of the last three International Technical Communication Conferences. However, none of these discussions has addressed editorial dialogue from the perspective of management theory. The need for such a discussion was brought to my attention during the question-and-answer session following my presentation at the 30th International Technical Communication Conference. My presentation summarized the positive results I obtained when I applied editorial dialogue as a technical writer-editor at a federal government research laboratory. The questions and comments I received from the technical writers in the audience indicated they were convinced that their editors/managers would not be willing to try dialogue in their workplaces. As a result of their conviction, I decided to write a paper describing some of the ways in which dialogic theory is in consonance with human resources management theory. This paper discusses the similarities that editorial dialogue shares with participatory leadership and job enrichment.

EDITORIAL DIALOGUE

I will not provide an in-depth review of the theory or practice of dialogue in this paper, because those subjects have been covered thoroughly in papers cited above (1, 2, 3). For the purpose of this discussion, it is sufficient to state that the application of dialogue requires the writer and editor to work together in conferences in which they both provide genuineness, accurate empathetic understanding, unconditional positive regard, a spirit of mutual equality, presentness, and a supportive psychological climate (1). Of course, totally successful application of these six characteristics is not required for effective dialogue. The characteristics represent the ideal toward which the participants aspire, and falling short of this ideal will not render the dialogue ineffective. However, consistent effort must be maintained in striving toward these goals, so that the participants can avoid falling into the trap of manipulative false dialogue.

PARTICIPATORY LEADERSHIP

For the purpose of discussion, think of the editor as the leader and the writers as the workers. In a typical organization, writers submit their drafts to an editor, who "corrects" the writers' "mistakes" without any significant consultation with the writers. Such an editor is obviously practicing nondialogic editing, but she is also practicing nonparticipatory leadership. Participatory leadership fully involves the workers in the decision-making process (5). Since an editor must make decisions regarding the content and style of material being edited, she must fully involve the writers in these decisions in order to practice participatory leadership in her editing. Editorial dialogue calls for writer-editor conferences in which the writers are fully involved in the editorial decision-making process. The application of dialogue in this example is therefore consistent with the application of participatory leadership. However, we still have not discussed whether the application of participatory leadership is appropriate in this situation.

The leader/editor wants to know how much time she can spend productively discussing editorial matters with her workers/writers when the discussions take time from her other work. Participatory leadership is most effective when decisions are nonroutine, when information must be gathered from subordinates, when severe time restraints do not exist, and when the workers have personal traits such as the following: competence, expertise, capacity for independent work, the need for independence, intrinsic motivation, and the ability to implement decisions (5). Like the characteristics of dialogue, these conditions do not represent the minimum requirements; they represent the ideal situation for the application of participatory leadership.

An examination of the conditions that justify the application of participatory leadership will help determine whether it is appropriate for the writer-editor relationship. Only the most basic editorial decisions can be considered completely routine. Any decision involving word choice, style, organization, or any of the other aspects of higher-level editing must be considered nonroutine in the sense that no choice would be universally correct. When the editor is working on manuscripts submitted by the writers, information has obviously been gathered from subordinates. The degree of time pressure present will vary with a given work environment and with different tasks within each environment. However, experience with dialogue has shown that, while it does take more time in the initial application, it can actually lead to reduced time requirements in subsequent applications (4). Clearly, each editor must evaluate for herself the degree to which her writers possess the required personal traits. Once again, however, experience with dialogue has shown that it can help develop some of these traits in writers (4). Therefore, two of the four conditions that justify the application of participatory leadership are satisfied in the writer-editor work relationship, and a third should be satisfied at least part of the time. Moreover, some evidence suggests that dialogue can mitigate the third condition and help create the fourth condition. It thus seems appropriate to conclude that the application of participatory leadership (and editorial dialogue) to the writer-editor relationship has sufficient justification in management theory to warrant at least some controlled experimentation.

JOB ENRICHMENT

Simply stated, job enrichment involves restructuring jobs to give workers greater planning and control responsibilities in the performance of their assignments (6). It represents an attempt to counter the extreme division of labor that has produced the job simplification and specialization that most behavioral scientists see as contributors to job dissatisfaction and decreased performance (6). Research and practical experience in management have shown that work should provide employees with positive satisfaction derived from greater use of their individual talents, and many companies have reported the successful application of job enrichment programs toward this end (6).

Continuing the analogy of the editor as leader and the writers as workers, consider the similarities between job enrichment and editorial dialogue. Job enrichment involves three elements: an increase in the workers' freedom to control their work and develop their skills, a job design that provides each worker with a series of varied and challenging tasks that are meaningful to the final product, and a replacement of the status differentiation between the leader and the workers with a team concept emphasizing shared goals (6). As the editor involves the writers in the editorial decision-making process, the writers gain more control over their work and have more opportunities to develop their editorial skills. Participation in the editing of their manuscripts gives the writers an additional level of involvement in the production of the final product. This editorial involvement should add variety and challenge to the work of writers who previously have been involved only in the writing phase of the process. Finally, a review of the components of dialogue leaves no doubt that it advocates teamwork and greater equality in the shared goal of creating the best possible final product. Thus, the theory and practice of editorial dialogue are in complete consonance with the theory and practice of job enrichment.

SUMMARY

Managers have the responsibility for implementing within their organizations any new programs such as editorial dialogue. Because some publications managers evidently regard editorial dialogue as a utopian theory that cannot be applied effectively in the "real world," I have used this paper to point out the similarities between editorial dialogue and two currently popular theories in human resources management. This paper was not intended as an exhaustive comparison of the theory of editorial dialogue and current theories in human resources management, and participatory leadership and job enrichment should not be viewed as the only management theories that are supportive of editorial dialogue. For example, the involvement of writers in the editorial process could be expected to produce suggestions for product improvement similar to those resulting from quality circles, which are presently receiving attention from managers. A further examination of management literature would certainly produce additional reinforcement for editorial dialogue, and I hope this paper inspires someone to undertake such an examination. My strongest hope, however, is that this paper will convince some publications managers that editorial dialogue is "practical" enough to be worthy of at least a trial application in their organizations. For me, dialogue represents an essential high-touch (7) component in the high-tech (7) process of producing technical documentation.

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A Classification of Author-Editor Relationships: Toward Team-Centered Relationships

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This literature review discusses articles about author-editor relationships. Three distinct types of author-editor relationships are found in the literature. (1) Editor—centered relationships are those in which the editor dominates. (2) Author-centered relationships are those in which the author is dominant. (3) Team-centered relationships are those in which the author and the editor work cooperatively with each other and with everyone involved in the process to produce the best possible product. As more and more information is available for dissemination, ways must be found to reproduce information more and more efficiently. An effective team relationship will provide the "high touch" that is required for efficiency.

When my colleagues at New Mexico State University were developing Editorial Dialogue, we decided we needed to know what the literature says about author-editor relationships. We needed to know if the work that Patrick Kelley, Louise Vest, and Mary Hageman were doing was as innovative as we thought. This literature review became my task.

We expected to find that the earlier articles discussed more authoritarian methods of editing while the later articles discussed more eclectic methods. We were surprised that we didn't find any chronological order to the styles of author-editor relationships that cut across time lines. We've chosen to categorize these three types of relationships as 1) editor-centered, (2) author-centered, and 3) team-centered. I will define each one and give you some examples of what authors and editors wrote about each one.

EDITOR-CENTERED RELATIONSHIPS

Editor-centered relationships are those in which the editor has the dominant role. The articles written in this area tend to focus on the adversarial relationships that often exist between editors and authors.

A large number of the articles on editor-centerd relationships deal with professional journals where authors submit their work for publication. In "Editing the Journal: Ave Atque Vale," Francis J. Braceland says that the editors send back the manuscripts and tell the authors what to do to correct them for publication. (Braceland, 1978). Although G. W. Hawley mentions cooperation, he considers exclusively what the editor expects from the author in his article, "What the Technical Book Editor Expects of Authors" (Hawley, 1954). M. Gates' article, "What the Editors of the Journal of the American Chemical Society Expect of Authors" lists the things authors must do if they want their articles published (Gates, 1954). Some of the things Gates and Hawley expect from authors are accurate drafts, logical presentations, good language usage, proper form, presentation of new material, and a willingness to accept changes.

A series of Letters to the Editor in Science magazine in 1952 and 1953 sums up these attitudes. K. H. L. Key charged in his letter, "Editorial Prerogatives (Author-Editor Relationship)," that his article in the Quarterly Review of Biology was mishandled by the editors, and that the meaning of his manuscript was altered by the editors without his consent (Key, 1952). The editors replied that they had no choice because Key was in Australia, and they didn't have time to consult him about the changes. H. H. Ketchan wrote to support Dr. Key. He accused the editors of trying to standardize all writing with their "unrestrained use of the blue pencil, with its consequent alteration of writers' thoughts and intents" (Ketchen, 1953).

Next, we have a group of articles written by technical editors from industry who discuss editor-centered editing. In his article "Care and Training of Authors (Author-Editor Relationship)," P. C. Miller discusses the "permanent warfare" between the author and the editor (Miller, 1955). Miller feels that the editor is the one who is in control of the relationship. To illustrate this he says, "After all, authors have certain rights, however minor and inconsequential they might be." Don Bush, in his article, "Content Editing, An Opportunity for Growth," agrees when he states, "To put this another way, the content editor finds the writing problems and attacks them" (Bush, 1981). Charles R. Stratton also seems to agree. In his article, "Ambiguity: An Exercise in Practical Semantics," he mentions that those editors who have complete control over the final copy are fortunate (Stratton, 1975). Manny Meyer, in "Diatribe of a Technical Editor," writes, "The more an engineer needs editorial assistance, the less likely he is to accept advice" (Meyer, 1968). Sylvia Fourdrinier makes similar comments in "The Editor as Teacher" (Fourdrinier, 1972).

Another group of editors discusses depersonalizing the writing. In "Editor's Bootstraps," Carlton E.

Brett says there isn't room for personality in technical articles (Brett, 1971). Gibson A. Cederborg agrees in "Role and Rationale of Technical Editors," when he says the editor's job is to depersonalize the drafts (Cederborg, 1975). And, finally, George Sideras in "Creativity in Technical Editing," ignores the author except to say, "Authorship may be sacred in the arts, but what makes it sacred in technical communication? The technical editor works for the reader, not the author, and must put the needs of the reader first" (Sideras, 1971).

AUTHOR-CENTERED RELATIONSHIPS

The second category is author-centered relationships. Author-centered relationships are those in which the author has the dominant role. The small number of articles falling into this category emphasized that the author's style should be preserved, and that the editor's role is to help improve the manuscript. An illustration is R. R. Shnitzler's "What the Writer Expects the Editor to Do." Shnitzler has a list of expectations for the editor, including "not to mess with the author's style," but he doesn't mention the author's responsibilities. He says, "I expect the editor to help me improve the manuscript so that material will be more clearly understood by the intended reader" (Shnitzler, 1960). In "Technical Editor and Mechanics of Publication," Roy G. Post adds, "The editor must not dictate style or influence the author's writing and usurp his prerogative as a creative author" (Post, 1970). Mary Fran Buehler, writing in "Situational Editing: A Rhetorical Approach," agrees that the author's style should be preserved as long as it's effective (Buehler, 1980). In "What Kind of an Editor Are You?" Allan Lytel sums up by saying, "The first job of the editor is to understand the writers" (Lytel, 1960). The editor should sell her services as a timesaver, according to E. Gilmore in "Get Your Reputation Rolling (Editor-Scientist Relationship)" (Gilmore, 1965). And, Della Whittacker is interested in teaching her authors by comments in the margins. Her article is "Editor? Teacher?" (Whittacker, 1975).

The ultimate in author-centered editing is described in "Every Engineer a Technical Writer," by Henry E. Francis. Francis puts it this way:

> We have a staff of three editors who teach our engineers to write. They are women--young and attractive, with pleasant, outgoing personalities that allow them to talk easily with a man about his writing. They are competent college graduates with degrees in English or Journalism, and with some previous teaching or editing experience. And they have a sincere desire to be helpful. None of them would last long if she tried to show off her own knowledge and ability at the engineer's expense (Francis, 1967).

TEAM-CENTERED RELATIONSHIPS

The third category is team-centered relationships. Team-centered relationships are those in which the editors and the authors work together--form a team to produce the best possible product. A large number of articles discussed the need for editors to meet with authors, or talked about editors working to gain the respect of their authors. Most of these articles don't give any guidelines for the meetings, though. Some of the editors who suggested meeting with authors are Lola Zook (Zook, 1981), Ernest Mazzatenta (Mazzatenta, 1976), Earl A. Love (Love, 1979), Alberta Cox (Cox, 1967), John B. Bennett (Bennett, 1961), Norman Haughness (Haughness, 1968), and Edward Layton (Layton, 1973). And in "A Guide for Beginning Technical Editors," Wallace Clements and Robert G. Waite say, "To avoid making your editing seem like a frontal attack on his ego, you must conscientiously strive to develop a harmonious relationship. Present the editorial changes as suggestions to be discussed rather than as accomplished facts" (Clements & Waite, 1979).

Another group of editors suggests strategies for meetings with the authors and discusses the relationships that should be developed with them. In "Turning Adversaries into Allies--Avoiding Tension in an Author-Editor Relationship," Michael S. Genin says, "The technique that I have found most effective consists of convincing the author that I'm on his side and that we both want the same thing--a clear concise report that communicates with its audience" (Genin, 1979).

Dart G. Peterson, writing in "Developing the Editor-Author Relationship," says "... mutual respect is the key." He also says, "The scientist expects to find the editor rational, self-controlled, confident, but ready to admit an error. If the editor also respects the scientist and looks for opportunities to compliment him on his writing, he will likely have little problem." He mentions promoting empathy between editor and writer (Peterson, 1976). E. J. Trueblood has a list of steps to good editor-author relationships that is similar to Peterson's. He suggests listing changes on a separate sheet of paper to keep the author off the defensive. He also suggests asking the author questions to put him/her at ease. Trueblood's article is titled, "Splitting the Atomic Engineer's Report Problems" (Trueblood, 1975). Helen Lindberg also makes similar suggestions in "Keeping a Sense of Humor" (Lindberg, 1979). An editor should "meet with the author and be sure both understand the goals and deadlines of projects . . . and kinds of editing changes that will be made," according to P. Taylor in "How to Get Along With Authors" (Taylor, 1981).

Barbara Collier and E. Jones writing in "Guides for ERADCOM Formal Reports," suggest that every writer needs an editor (even editors who are writing need an editor), confirm the author's position as technical expert, and suggest face-to-face meetings when time allows. "Both author and editor should remember whose name will be printed on the cover of the report and act accordingly" (Collier & Jones, 1979). Finally, in "Getting It Right With the Author," James DeQuattro suggests careful planning for the meeting between the editor and the author, but he goes one step further than Taylor; he warns the editor not to be adversarial. If an impasse is reached, according to DeQuattro, the editor should move on and return to the problem area later (DeQuattro, 1979).

A small group of articles discussed editing by dialogue which is team-centered editing at its best. Nelson Briggs first mentions the concept of dialogue in relation to technical writing and editing. In "Editing by Dialogue," Briggs defines dialogue this way: "Dialogue is concerned with a person; with subject matter; with improvement (rather than correction); and with mutuality of editor and author (rather than the domination of one by the other)."

Briggs relates dialogue to Martin Buber's I-Thou relationships and to technical editing (Briggs, 1969). Lola Zook writes a review article called "Editing and the Editor: Views and Values," in which she mentions dialogue. She writes, "Never let battle lines be drawn with writer and editor on opposite sides;" and "Never back anyone into a corner by making a flat pronouncement of how things will be done" (Zook, 1981).

Patrick M. Kelley also defines dialogue in terms of its use in technical writing and editing in "Charting A New Course for Technical Writing and Editing: Technical Writing and Editing as Dialogue." Kelley uses the work of Richard L. Johannesen and Carl Rogers, as well as that of Martin Buber, to formulate his definition. Kelley refers to dialogue as "the truest form of communication" (Kelley, 1982).

Mary S. Hageman, Louise M. Vest, and Patrick M. Kelley propose editorial dialogue: an application of Buber's I-Thou theory of dialogue to technical editing by adapting Richard L. Johannesen's concept of communication theory. They describe the dialogic reltionship this way: "A writer-editor relationship that is a caring, supportive human relationship is a functional, durable relationship." Their article is "Editorial Dialogue: An alternative Writer-Editor Relationship" (Hageman, Vest, Kelley, 1981). In "Developing an Alternative Writer-Editor Relationship: A Workshop in Editorial Dialogue," Louise M. Vest and Mary S. Hageman present "an in-house workshop that teaches editors to correct and clarify documents without destroying the style, voice, or ideas of the original writers." According to Vest and Hageman, "One of the keys is notetaking during which the editor asks the writer to explain orally the meaning of any unclear passages. While the writer talks, the editor notes key words and phrases; then she suggests that the revisions be made in the writer's own words" (Vest & Hageman, 1982). This is the first time that writers and editors are brought together to practice each other's skills and to learn from this practice.

CONCLUSION

In this age of high technology with its tremendous proliferation of information and the resultant stress that is placed on those responsible for disseminating this information, the skills and caring that result from practicing editorial dialogue ("high touch," if you will) are extremely important. The mutually supportive relationship that results when dialogue is practiced should ease the burdens of both writers and editors because they can work together in harmony to try to keep up with the incredible amounts of information they have to disseminate.

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Online Editing

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The editing process is complex: it usually involves several passes for different levels of analysis. Traditional methods and the image of red-pen wielding editors are being revised as more editors begin to use online editing on a daily basis. Four papers will be presented in this session on Online Editing that reveal some of the changes and adaptations necessary for a successful conversion to electronic text editing. The first paper, by Susan B. Dunkle and Purvis M. Jackson, discusses ways in which the editing process can be assisted by the use of commercially available software packages which can help reduce production time and cost, and still ensure good document quality. The second paper, by Charles Fenno, discusses how quality can sometimes be lowered by additions and deletions during electronic editing, and describes several electronic text editing/word processing features that can be used along with traditional editing methods to improve the quality of online editing.

The third paper, by Jody Heiken and Diane D. Norton, reveals how two editors successfully made the changeover from red pens to electronic keyboards, and offers several useful suggestions to future novices for a smooth conversion. The author of the fourth paper, Deborah E. Swain, proposes using some unique automated tools to assist online editing, and she would like to hear about additional suggestions or methods used by other editors.

A Systematic Approach to Editing

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The purpose of this paper is to discuss an editing scheme to lower production costs by reducing document preparation time. The paper describes, briefly, tasks in the editing process and technologies that could be developed feasibly to assist those tasks. It proposes methods for distributing editing tasks among support personnel to lower the demands on document authors and editors while ensuring document quality and consistency.

The editor's role in the documentation process is analogous to the role of a quality control supervisor in a manufacturing environment. In both cases, the person's responsibility is to ensure that the final product adheres to product specifications. In the case of the editor, however, the product specifications are not defined clearly because there are no universally accepted conventions, no well defined models for correctness in all cases: There is no absolutely "right" model for every document of a type. Instead, documents are "right" or "wrong" according to accepted contextual norms, which depend on the producing organization and the document users, or audience. A document may be judged problematic for violating norms on three levels: the language level, the producer level, or the audience level. Yet many people view editing as a search procedure for a standard set of errors rather than a systematic search procedure for multiple levels of potential errors.

Editing Levels

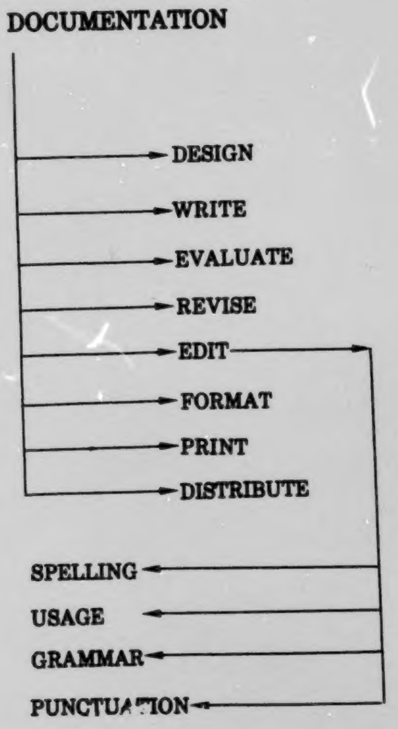
Accuracy at the language level is difficult to obtain in every case because the editing process is far more complex than many people realize. Part of the problem is due to the many rules of rhetoric and linguistics that are difficult to master; another aspect of the problem is due to the way individuals approach editing. Since the editing process entails different levels of analysis, a person can easily overlook errors if attempting to search for all potential errors simultaneously. For example, consider the difference between searching for misspelled words and reading for accurate placement of parts of speech: The two tasks involve entirely different processes, i.e. character level pattern matching vs. argument ordering within propositions.

Correctness at the producer level is defined by the organization. Organizations often use special terms or constructions that they believe to enhance their images and avoid others they consider to be unattractive. In both cases, an editor must remain aware of the organization's preferences, whether or not they violate the rules of the language or general notions of style [7].

On the audience level, problems may arise if the editor knows what to say but not "how to say it" in a way suited to the intended readers. As a result, the text may be correct according to the rules of the language and the norms of the organization but incorrect according to the norms of the audience. Complaints about such texts include too many abstract or specialized terms, confusing syntax, nonrelevant information, nonlogical organization, and ineffective illustrations [4].

The Documentation Process

The documentation process may be thought of as a sequence of discrete sets of related tasks that must be performed properly to develop an appropriate document. We define the discrete sets as *routines*, which are composed of related *subroutines*. Though it doesn't represent all the detailed tasks in the documentation process, the figure below shows editing as a routine that we operationally define to be distinct from the other routines.



Editing, as operationally defined, comprises four subroutines: spelling, usage, grammar, and punctuation. Often, people assume that an editor's responsibility is to check documents to make sure they conform to a manageable set of well-defined rules associated with these subroutines. However, rules of appropriateness are associated both with the subroutines and with document types. Some of the rules of appropriateness apply equally to both, but others are document specific. Accepted violations of the language are common in some public relations documents, and injunctions against redundency are contrary to the goals of some types of instructional documents, especially user manuals for computer programs.

Editing Technologies

As the editor's role has become more complex, new techniques and technologies have been developed to assist us in our duties. Word processors and computer text editors are probably the most widely recognized of these new technologies, and they have certainly provided an effective way to handle revisions without retyping entire manuscripts. Within in the past several years, more sophisticated systems have been designed to provide increasingly facile support for editorial decisions. However, some of these systems incorporate programs that are relatively useless to "novice" linguists. For example, the *Style* program included in the *Writer's Workbench Software* package [1] generates a wealth of analytical information, but its usefulness depends on the user's ability to interpret the output and modify the text to achieve appropriateness. In contrast, the experimental *EPISTLE* system of *IBM* [2] is being designed to provide "intelligent" functions through user-friendly attributes, including color coded multiple display windows, error explanations, and light-pen activated menus.

While the systems that have been designed thus far differ greatly in their final attributes, they have a common *inner loop*, i.e. they use a generic function: pattern matching. To detect errors in input texts, pattern matching algorithms compare words and phrases in the input to *items* in a *reference list* [6]. For example, spelling checkers compare items in the input text to items, i.e. correctly spelled words, in a dictionary reference list.

Generally, spelling checkers are designed to search for one to one matches between input and reference items. Checkers respond to one of two conditions, a match or a no-match, according to associated rules. If an input item matches an item in the reference list, the checker compares the next item in the text. If an item in the input text fails to match an item in the reference list, then the checker assumes a misspell and treats the item as an error. The procedure is fairly simple:

```
IF input item matches item on reference list,
Then check next input item.
Else, treat input item as error.
```

In addition to spelling checks, pattern matching algorithms can be applied to usage, grammar, and punctuation problems. However, unlike spelling checks that positively evaluate direct matches between input items and items in a reference list, usage, grammar, and punctuation checkers search for known errors or "potential error signals" entered as items in reference lists. For example, with a spelling checker we want to find deviations from an accepted reference list of correctly spelled words, but for the other subroutines, the reference lists would become tremendously large if we were to list all correct constructions: Listing errors is far easier than listing all correct constructions and searching for a no-match. Therefore, "error lists" containing only those constructions that we accept as problematic are far more feasible to search for and detect. We can search for problematic items in the text, rather than comparing items to every acceptable construction in the language. This approach has been used in the *Writer's Workbench Diction* program developed at Bell Labs [6,1).

The distinction between the match and no-match conditions is often not as important as the "rules" we attach to them. The rules determine what we do when we find a match or no-match. For example, with spelling checkers, a match has the rule "accept item" attached to it; a no-match has the rule "reject item" attached to it. For errors of usage, grammar, and punctuation, the rules are contrary to those of the spelling checker: A match has the rule "reject" attached to it, and a no-match has the rule "accept" attached to it.

Errors may be classified according to the way we respond to the attached rules: delete item, replace item, or context dependent response. We call these responses *actions.* For the first class of errors, the associated rule is "reject", and the "action" is to "delete" the "item" from the text. For example, the phrase "currently in the process of" could be a class one item, which could be deleted without altering the semantic content of the sentence in which it occurs. Consider sentences 1. and 2. below: Is meaning lost in the conversion?

1. We are currently in the process of writing a program to delete unnecessary words and phrases.
2. We are writing a program to delete unnecessary words and phrases.

For the second class of errors, we "reject" an "item" and "replace" it with an acceptable "reference item". *Input or output items* may be words or phrases. For example, for sake of economy we prefer to substitute "to" for "in order to" when it appears in a text. Again, is meaning lost between sentences 3. and 4. below?

3. In order to edit systematically, we are writing a program that will substitute words and phrases automatically.
4. To edit systematically, we are writing a program that will substitute words and phrases automatically.

For the third class of errors, rejected items require context dependent response. For such items, we want to detect textual characteristics that indicate potentially unacceptable sentence structures. Potential error lists may include passives, expletives, nominalizations, or any other constructions that a particular organization considers to be problematic. Thus if we consider nominalizations to be problematic because they often occur in sentences that express no direct action [3], then we would want to detect all nominalizations in the input. Instead of a reject rule, we would attach a "query" rule. In such cases, the editor could check sentences for improved structure. In some instances, the editor could revise the sentence into a more active form by changing the nominal noun into an active verb and adding an agent as in sentences 5. and 6. below.

5. Their discussion was about the birds and the bees.
6. They discussed the birds and the bees.

Rather than listing all nominalizations fully spelled, we can search for character strings "types" that will signal many "token instances" within different words. Such a "minimal representation" can allow us to detect the token cases by searching for the type signals only. For example, a large subset of nominalizations end with the following character strings: *ly, ion, nce, ness, ry.* Thus, any word ending with one of these strings could be matched, and the editor queried for context dependent actions.

Context dependent actions would depend on human discretion, but the first two classes of errors could be handled automatically if processed through the proper editing facility.

For example, the *Lex* program developed at Bell Labs [5] converts input texts into output texts according to actions associated with character strings. For example 1. above, the Lex pattern to delete the phrase would look the following way:

```
%%
"currently in the process of"   printf("");
```

By listing class one and class two errors within quotation marks on the left and response rules within the quotation marks on the right, users can build automatic editors to correct low level errors or to place editorial comments that focus attention on errors that require context dependent response. For example, we might represent a subset of nominalizations with the "ion" character string. Since the response will be context dependent, we might want to attach the rule "revise nominals" to each token occurrence within the text. Such a "comment" could be included in a *Lex* program in the following way:

```
%%
"ion "   printf("ion **revise nominals**");
```

Such a program would output the text with the comment immediately following all "ion" strings in the text. For example, sentence 7. could be input, and the *Lex* program output would include the comment as in sentence 8.

7. Our discussion was about three important topics.
8. Our discussion **revise nominals** was about three important topics.

Systematic Editing

For a systematic approach to editing, reference lists could be composed of subsets of errors. These subsets would form a series of *modules*, each corresponding to a positive facet of the overall editing routine. Such modules may be combined to describe evaluative *models* for each document type produced by the organization. An editing group could then correct input texts systematically. Each person in the system would have a particular subroutine to perform based on the output from the relevant modules. Thus, the massive rule set could be divided into discrete procedures that could be performed independently by the people in the editing system most qualified for each task. Such an approach would allow the overall documentation system to better use the talents of the people involved, which would result in lower production times and costs. Within such a system, writers could spend more of their time composing texts, and editors could spend more of their time concentrating on issues of design, organization, printing, and distribution. Further, the absence of particular people would have less severe implications to the editing system because texts could proceed through the other modules and remain in a queue until the qualified person returned to work. The net effect of such an approach would be to ensure document consistency while improving production.

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Improving Quality during Electronic Editing

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The author examined electronically edited documents, attempting 1.) to identify what characteristics of effective technical writing are most vulnerable to damage during electronic editing, 2.) to infer the causes of their vulnerability, and 3.) to find ways to improve the editing process. Comparison of drafts at different stages in the editing process revealed examples of deterioration in unity, coherence, and completeness within paragraphs, and some weakening of emphasis within and between paragraphs. The author defines these four characteristics and suggests why each is vulnerable to damage during on-line editing. The paper concluded with suggestions for handling these problems.

By now, most of us who write, edit, or teach have accustomed ourselves to the electronic technology that has entered our professions. What at first looked like a specter of the future, blinking and glowing with a dim phosphorescence, we now view as a productive - although occasionally erratic - co-worker that can turn out an impressive amount of work when not on sick leave. We have learned its language, figured out how to work around its weaknesses, and sometimes even coaxed it to rise above its limitations.

But every so often, technical communicators see evidence that the qualitative results of the electronic office have not kept pace with the quantitative results. Quantitatively, we can do more work, and do it faster, in the three principal areas that we manage: composing, editing, and producing final copy. In addition, we have made some qualitative gains. Writers find that the computer helps them compose; the creative juices flow easily when there are no penalties for second thoughts. Similarly, finished copies, correctly formatted, checked for spelling, and automatically indexed and paginated, also show qualitative improvement when compared to copies produced by earlier methods.

In the third area, the editing steps between composition and final printout, qualitative gains have been less evident. Although the computer inserts, deletes, and moves text in nanoseconds, the content of the printout sometimes resembles a patchwork design rather than the tightly structured, closely reasoned text we need. The copy is usable but not completely satisfying. When we have to end an on-line editing session by reaching for a pencil, we sense that in electronic editing, we are still not where we want to be.

During the past several months, I have been looking at the electronically edited work that crosses my desk at the Air Force Institute of Technology. My goal is threefold: 1.) to identify what characteristics of effective technical writing are most vulnerable to damage during electronic editing; 2.) to infer the causes of that vulnerability; and 3.) to find ways to remedy the situation.

To impose some standardization on this investigation, I selected manual-length documents that had been planned in outline or diagram form, that had separate sections or chapters, that were technical in content, that had been written and edited incrementally, and that had been processed on either mainframe or microcomputers with word processing software.

The method was comparative - examination of each document's outline, first draft, first edited draft, and final draft, with most attention on the first draft and the first edited draft. The entire investigation was less a scientific experiment than a personal exploration, one of those tasks we undertake when we want to improve our own skills.

The comparison suggests that electronic editing improves some characteristics of the first draft, most notably the sequencing of sections and the ordination of main points. Generally, the physical form of the documents moves much closer to the final form in the edited versions. And the tone of the documents improves with electronic editing - the writer's relationship to the reader and content becomes more consistent. On the narrowest end of the improvements, the basic grammar and mechanics of individual sentences improves. Of course, the spelling also improves, but most of the edited texts have been run through spelling software.

In contrast, the texts show no significant improvement and some examples of deterioration in unity, coherence, and completeness at the paragraph level, and some weakening of effective emphasis within and between paragraphs. These four characteristics - unity, coherence, completeness, and emphasis - seem to have suffered, or at least not to have improved, during electronic editing.

The answer to the second question - why these characteristics should be vulnerable during electronic editing - can be found both in the nature of the on-line editing process itself and in the nature of the four characteristics. The physical process of electronic editing (and here I mean editing done on-line in real time on a screen or printing terminal) predisposes the editor to take a micro view of the text. That view is conditioned in part by the way the text is stored in the memory, but more by the physical limitations of the screen, which at best usually accommodates one or parts of two pages. Although the editor knows that other pages can be called up, that process requires clearing the screen or scrolling up or down.

These procedures are in marked contrast to the way many editors worked in pre-computer days. Then, we sat down with a paper manuscript, pencils, scissors, and the technological marvel of that age - transparent tape - and cut, repositioned, and rewrote text to create the document we wanted. We could flip copy back and forth; comparisons were convenient; and we easily kept our attention on the whole while reworking the parts. Those ragged pages provided, as it were, a macro view, in contrast to the micro view on the small screen. I hope I am not misunderstood on this point: I am not suggesting that editors are so feebleminded that we can think about only what we see on the small screen. If that were the case, edited texts would not show the improvements I mentioned earlier. Nonetheless, the confines of the small screen and the reduced accessibility of three, four, or a dozen pages or sections for comparison do seem to limit our focus and restrict our attention. At least, they do mine.

The other reason for the special vulnerability of these characteristics lies in their nature. Let me define the concepts as I am using them here. Unity is the familiar concept that paragraphs are groups of sentences that develop a single idea, in technical writing usually explicitly stated in a topic sentence rather than being implied, split, or imbedded. Similarly, in larger units of prose, unity is the concept that all paragraphs must contribute to the unifying ideas of their respective sections.

Coherence deals with the mental connection between ideas. At the paragraph level, sentences connect to each other by such mental links as cause, effect, enumeration, generalization, amplification, and a score or so others. When these connections are in place, readers move from sentence to sentence with a comfortable sense of direction. In short, coherence gives technical writing that quality which some composition teachers reverentially call "flow" and the current jargon calls "connectedness." Paragraphs must cohere to each other too, with clear mental connections between their unifying ideas.

Completeness in our business usually means three things - two fairly concrete and one judgmental. The most elemental form of completeness requires that the text deliver any specific number of items it has promised: a six-step process must have six, not five, steps discussed in the text. The other concrete type of completeness is achieved by giving the reader enough facts to support generalizations asserted in the text. This kind of completeness is especially important in persuasive texts such as proposals and position papers, and in research reports.

The third kind of completeness, which I called "judgmental" because it requires more judgment calls from both writers and editors, is the requirement to supply enough primary and supporting information for the reader to understand and use the document. Since much technical communication is utilitarian, designed to help someone do something, writers and editors use examples, illustrations, and definitions to ensure understanding.

In the term emphasis, the fourth characteristic, I include emphasis in content and emphasis in style. During editing, both are managed at the sentence level. Editing keeps parallel ideas in parallel form; it retains and strengthens correct ordination (and subordination) among ideas; it ensures proper sequencing of enumerated material that has inherent sequence.

And in a purely stylistic sense, technical editors use emphasis to avoid its opposite, monotony. In our profession, style is seldom, if ever, an end in itself. Most technical editors prefer what might aptly be called invisible style - one that so effectively communicates the message that the reader is never distracted by the medium. Such style is neither easy nor accidental. It requires deliberate choices and subtle variations to keep any single stylistic element from becoming rhythmic and repetitive. Editors vary sentence type (although simple and complex predominate); they vary sentence length (although generally preferring shorter to longer); they vary sentence organization (although preferring loose to periodic).

Similarly, we vary verb types, modifier patterns, and other elements to achieve invisible emphasis. In our profession, invisible emphasis is not an oxymoron. To the extent that technical communication is an art rather than a science, it is in the use of emphasis that the art is most evident - not to the reader, who sees only the message, but to our peers, who recognize the means we have used.

With these definitions of unity, coherence, completeness, and emphasis as background, we can see why these characteristics are affected by on-line editing. More importantly, we can begin to see some ways to improve these characteristics during editing.

Unity is most vulnerable when blocks of sentences are moved or when new sentences are inserted. In these cases, the errors that occur are usually problems of misplacement. The best strategy for avoiding them is to be certain that we have a thorough command of the computer's software, so that changes go where we want them. An effective strategy for verifying unity is to check the placement of all edited material before the text is rewritten to file. If the editing involved moving or creating paragraphs, we may want to check for unity by scrolling the edited section and reading only the topic sentences of successive paragraphs to be certain that all are related to the section's unifying idea.

Coherence, the mental linkage between sentences and paragraphs, is particularly sensitive to additions and deletions during editing. At the sentence level, a few extra minutes spent reading the sentences just above and just below the edited passage, confirming that the connections are present, are minutes well spent. Wherever the reader is required to move from idea to idea with no perceptible bridge underfoot, more editing is required. Sometimes the correction is as simple as inserting a conjunctive adverb to reinforce coherence: although real coherence lies in the meanings of the sentences rather than in connecting words, an aptly chosen connector can signal the mental relationship quickly. At other times, the correction is as complex as rewriting the edited section to eliminate incoherence.

Coherence should also be checked when several paragraphs in a section have been edited. Here, as in the check for unity, scanning the topic sentences of successive paragraphs can reveal when coherence is present or absent. Speed reading courses capitalize on the fact that topic sentences between paragraphs must cohere to each other exactly as sentences within paragraphs must cohere. We can capitalize on that fact too.

In the documents I examined, a few completeness errors in the first edited drafts were caused by accidental deletions and forgotten "save" commands. In some other instances, the errors may have occurred during composition rather than editing: the authors changed their outlines midstream but forgot to change their introductions. Elsewhere, editing was the likely cause. Supporting material was deleted in the interest of concision, even when the material was needed to support generalizations or conclusions. This last type of error is hardest for an editor to handle since, in highly technical material, only the authors may know "how much is enough." In these cases, editors can at least mark passages that need the author's attention. Elsewhere, a quick check on numbers of promised points and completeness of data will eliminate some of these problems.

Because emphasis is the most subtle of the four characteristics in this list, it is the hardest to maintain and to verify during editing. However, editors can match sentence type to sentence content, can be sure that necessary parallelism is maintained, can doublecheck that sequences have not been misarranged when text is shifted. Concerning style, the editor can wisely invest a few minutes to confirm that insertions and deletions have not caused accidental repetitions of sentence patterns, thus producing monotony. Headings and subheadings, which signal the relative emphasis of sections, also need careful attention during on-line editing.

Perhaps the most important lessons learned from this small examination of electronically edited texts are, first, that the same basic characteristics which defined effective technical writing fifteen years ago are still essential today. The changes in our ways of doing business neither required nor permitted any lowering of the highest standards we set for ourselves as technical editors and writers. And second, I have found that by consciously reviewing these characteristics, by seeking them on the phosphorescent tube, I can make the electronic medium accommodate them. I am increasingly optimistic that we can make qualitative improvements when we edit in tomorrow's electronic office.

Acknowledgement:

Most of us can recall with appreciation the mentors who helped us develop our professional skills. For the content of this paper, I am indebted to Dr. Claude Faulkner at the University of Arkansas, who influenced my perceptions about what makes communication effective.

Mechanized Editing: We Won't, We Can't, We Did!

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If you are now, or ever have been, unexpectedly confronted by the demands of mechanized editing, you have our sympathy. We too are making that sometimes frustrating transition from editing by traditional methods to editing on word processors. In this paper we discuss some necessary attitude adjustments, problems we encountered, and ideas that helped us maintain our sanity. Although our work situations differ (one of us edits, writes, and coordinates word processing with the secretary; the other edits, writes, and operates the word processor), our problems have been similar. Because our suggestions are basic, they are aimed at initiates to word processing rather than at old hands. However, if you are a whiz at video games, operate your own home computer, or learned to use a word processor proficiently in your spare time, please send us your name and address.....we need *your* help!

INTRODUCTION

To the dismay of many editors, paper and red pencils no longer are the mainstays of the editorial profession. The Machine Age of Editing has reared its video-data-processor head—spurning pencils and paper, introducing new meanings for old terms, demanding that we learn (and use) keyboard skills, wreaking havoc with our long-established filing systems. In short, editing is not what it used to be. To survive in this unfamiliar world of diskettes, drive units, gold keys, and user numbers, we must change our style and some of our premises about editing. Changing our style includes reevaluating our attitudes about machines, about editing, and about our relationships with authors. But *how* do we make these fundamental changes? Read on, where you will meet two unabashedly old-fashioned editors who, with red pens clutched defiantly above their heads, met the challenge and finally learned to love their word processors.

ONE EDITOR'S TALE: FOOLS RUSH IN...

Several months ago I dutifully accepted a long-term assignment to a chemistry group. With new assignments come new challenges and new situations, but little did I know just how new and how challenging this particular assignment would be. The first day I was greeted by a friendly young chemist mouthing these incomprehensible words: "Here's disk EJP005 to copy. We need to edit document 3, then run a copy on the LPQ02. And don't forget your backup."

Disk? Document 3? LPQ02? Backup? When he realized my ignorance about disks, documents, LPQ02s, and backups, I received a short lesson on using the word processor, after which I was reassured, "Don't worry. Anybody can learn in 20 minutes." Twenty minutes later I still was poring over the 234-page reference manual, trying to understand such listings as simple automatic pagination and simple multicolumn printing. Take my word for it; nothing seemed simple that first day, except me.

As I see it now, the philosophy underlying my particular education in editing on a word processor can be summarized as sink and swim. First I sank and then I gradually learned to swim. Because there were both proposal and report deadlines to meet that first week, I did not have the luxury or time for a cathartic bout of hysteria nor the sense to wonder *if* I could master this awful contraption. The only question was how soon. From such inauspicious beginnings have come a respect for word processors (both the equipment and the people) and a different approach to editing. Now, with neither sweaty palms nor cold feet to distract me, I can calmly peruse the advanced manuals, noting such optional features as leaders and trailers, numeric sort description, and invisible hyphens. In fact, at times I am so bold as to call myself a sophisticated (old term, new meaning) user.

USER'S
GUIDE

Do 234-page reference manuals give you sweaty palms and cold feet?

ANOTHER EDITOR'S TALE: ....WHERE ANGELS FEAR TO TREAD

At the first mention of editing on a terminal, my skin crawled and I feared for my future with the written word. The entire idea was sacrilegious! The very concept was a denial of a reader and writer's hedonistic delights. I like to feel the paper's crispness and the heft of a thick manuscript. I enjoy the way ink flows from different red pens. Now I was being asked to give up these guilty pleasures and content myself with ghastly white letters on a dead black screen. I wouldn't even be in control any longer. The terminal emits imperious little bleeps when the secretary doesn't meet its expectations. I wasn't cut out for this. I—whose heart accelerates in dread when setting the timer of a microwave oven, who must be the only person under 85 in Los Alamos, New Mexico, who has never played a video game—was being asked not only to confront the word processor monster but even make friends with it, and (worse) allow it into my daily working life. HORRORS.

The office staff was very kind and understanding. The first day they merely introduced me ("Terminal, this is Jody; Jody, meet the word processor terminal") and then gently led me away. The second day I was encouraged to sit in the chair and place my hands on the keyboard. By the third day, I was ready for the big time; with the secretary hovering protectively over me, I gingerly typed in my name, the date, and finally, a document paragraph (with errors). I held my breath as I watched the letters, words, and then the sentences lighting up the screen. Oh, the heady feeling of creation! I was hooked. However, after the first flush of victory and enthusiasm, doubt set in. I had naively assumed I could transfer most of my traditional working methods to the word processor. Having conquered active dislike of the equipment, I now mistakenly saw it as a supercomputer that combined the skills and versatilities of typewriter, computer, printer, and, of course, the human hand and brain. Obviously, this early infatuation was short lived, but it matured into a healthy respect for the word processor's true capabilities.

PROBLEMS AND SOLUTIONS: USER FRIENDLY WORKS BOTH WAYS

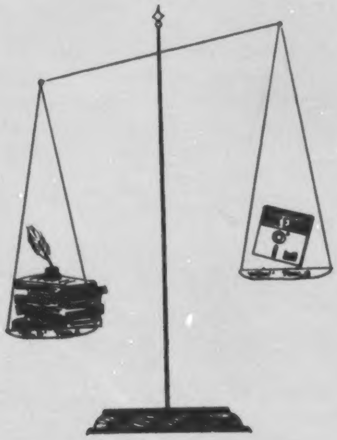
The difficulties that we encountered are not particularly complex and certainly not insurmountable; nonetheless, some were frustrating to the point of machine abuse. But even with simple problems, it is reassuring to know that other people have suffered similarly and that other editors were bewitched by the array of keys, bothered by the new jargon, and bewildered by the flat, floppy piece of black plastic called a disk. Our problems ranged from misconceptions about machines to finding ways to communicate effectively with multiple authors. No matter how painful your initial problems or mistakes, remember that they are temporary, not terminal.

I Hate Machines (And Don't Like Computer Games Either)

For most of us, the initial problem when learning to edit with a word processor is one of attitude adjustment. Because the psychological transition from paper to screen, from pen to keyboard can be downright disheartening, we cannot expect to achieve a sense of mastery in a day, a week, or even a month. However, being creatures of habit, we soon establish routines with the word processor that are as comfortable as our old habits. For example, inserting disks eventually will trigger our editing instincts the same way that sharpening pencils used to do. After a while, it will not seem awkward to have the words on an upright screen rather than flat on a desktop. Nor will it seem strange to erase a word with a key stroke rather than with a red swiggle.

Take heart. Although these adjustments occur gradually, they do accelerate as our skills and confidence increase. It will help if you put down the pen, forego the paper, and USE the word processor. Do not merely think about using it; actually place your fingers on the keyboard and input a document. First try something simple, perhaps a letter or paragraph from a report. Next proof the document on screen. Resorting to a hard copy is cheating!

At the same time that you are coping with these psychological adjustments, you also must cope with the physical aspects of the equipment itself. For a novice, merely finding and using the on/off switch can be an ordeal. (For instance, some word processors designate on/off with the numbers 1 and 0. To confuse us maybe?) Changing ribbons, printwheels, and paper can be difficult for editors and writers who do not consider themselves "mechanical." Hereafter, when in the presence of your word processor, simply forget the words *mechanical* and *not mechanical*. Eliminate these emotion-laden words from your vocabulary, then practice inserting the ribbon cartridge, changing print wheels, and adding paper to the printer. Reading the installation manual (as well as your reference manual, of course) will help you identify the names and locations of parts. The more you know, the more in control you will be.



A single disk or a mountain of marked-up drafts—weigh your options.

Now To Edit.....But How?

Traditional markings and procedures cannot be used when editing on a word processor. For example, you can't put a red line through words to eliminate unnecessary phrases. You can't use little carets to add words. All you can do is change the sentence, but this leaves no record for the author to see what you have rewritten. The question is how to draw the author's attention to your editing changes. You cannot use brackets to indicate your corrections if the report contains chemical equations with bracketed components. You cannot use all caps if a report employs acronyms. Underlining already is used to indicate words that will be italicized by the typesetters.

You also need a method of querying the author or commenting on the text. Don't grope for your trusty red pen while you try to compose a tactful question; you can't write on the screen's surface. Neither can you type in the margin because word processors do not have margin release keys. How will you write those wonderfully acerbic little comments to the author or question the intent if you don't use the margin? You could write the comments on 123 little yellow stickies and attach them when the hard copy is printed later, but only if you can remember where each should be stuck. Because the author wants a hard copy of the report, it is not possible to use the word processor's comment option, for these comments appear on the screen but not in the printed document.

One solution to this problem was worked out by trial and error and consultation with the manual. Margin settings are "rulers." If you want to change them (to provide space for your comments to appear at the right or left of the text), you must press about 12 keys to change the first ruler, type in your comment, and then press another 12 keys to reestablish the first ruler and reposition the cursor in the text itself. Everytime. (Now you know why they call it a cursor.) Are your queries worth all that? Definitely debatable. There is a short cut, however. The manual mentions user defined keys (UDK) by which you can store sequences of miscellaneous strokes. Eureka! After defining those UDKs, two strokes will take the cursor to a narrow column on the right or left. You type your few words of wisdom to the author, and with another two strokes you are back to the text in the normal ruler.

Not every problem will be as complicated as this one, but a combination of experimenting and reviewing the manual can provide many solutions.

A Little Help from Our Friends

One obvious, but often overlooked, way to troubleshoot is to find someone who operates the same type of equipment. Most people are more than willing to answer questions and explain indecipherable sentences from your reference manual. Even if they can tell you only what didn't work for them, their help can save you time and frustration. Describing your problem forces you to organize your thoughts, and this alone often leads to a solution.

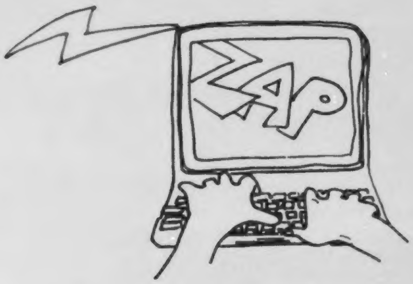
In addition, many word processor manufacturers provide hot lines for those times when you are desperate. When you have tried everything and everything seems to be the answer to someone else's problem, call the hot line. The people who answer are patient, even when you do not know how to phrase your question, and they do have answers.

Should I Admit I Can Type?

For editors with less than efficient keyboard skills, the task of adapting to word processors is even more challenging. Typing often does not receive the respect it deserves. Today, for example, many people belittle their typing skills for fear their professional images will be tarnished. Typing and other keyboard skills should be highly regarded, and in some editorial positions they are required. Scientists, engineers, managers, and sundry others now take pride in their ability to pound away on computer terminals and word processors. If you do not know how to type, learn immediately!

Ooops—What Have I Done Now?

When typing, we all make mistakes. Editors probably make more errors than others because our minds are divided between editing and typing. Typographical mistakes are immediately obvious on screen, so our professional eye catches them quickly. However, when our fingers slip around on "invisible character" keys, strange things are apt to happen in the document. Because these characters do not appear on the screen, commands such as dead key, superscript, subscript, bottom and top document, center, and print hyphen can cause problems. Not only can they interrupt the editing process, they also can introduce errors into the manuscript (every editor's nightmare). Fortunately, it isn't necessary to wait until we print the document to see the mistakes; the view option will display the text in double-space mode, including all invisible characters, super- and subscripts, and imposed hyphenations.



Unexpected electrical surges, storms, or outages can zap your day's efforts.

Gone in a Flash

Document storage is another area that requires some changes in attitude and habit. No longer must every rendition of every document be carefully filed in your bulging gray filing cabinet. Aside from the obvious space savings (100 to 125 pages of text can be stored on a disk that is about the size of a 45 rpm record), there is the potential problem of losing what you have stored. Paper, we know, is vulnerable to fires and floods. But how many of us actually have had paper copies of documents destroyed by these two catastrophes? On the other hand, disks, with their magnetic coatings, are subject to the vagaries of electrical storms. And, we promise you, information on them can be lost forever. To prevent such disaster, make backup copies of your disks every day. This is another task that, though annoying at first, soon will become automatic. Better to spend a few minutes copying your disk than several hours retyping 75 pages.

THE EDITOR/AUTHOR/MACHINE RELATIONSHIP: IS THREE A CROWD?

There are as many types of editor/author relationships as there are editors and authors. And now we have this third party, the machine, to complicate matters even more. Our feeling is that with flexibility and a measure of good cheer the job will get done. Your word processor really does not intend to sabotage your efforts in order to make you appear foolish in the eyes of the world. In fact, the machine has no intentions at all! If first we recognize its limitations and then progress to recognizing how it can work for us, we can help authors in even more ways than before.

Do encourage authors to input their own text. From there, it is a simple matter to copy their document onto your own disk for editing. Authors who input their own work not only become competent with word processors, they also understand the machine's limitations and why two pages sometimes take 20 minutes to print. In addition, they usually are very willing and able to do their own finals when necessary. When each individual on the team is as competent as possible, high-quality documents can be produced faster and more efficiently. Especially where there is no secretary or where speed is of the essence, authors, like editors, should know how to use the keyboard.

With short documents and rush jobs, some authors are willing to review your editing on screen. Immediately after making the agreed upon changes, you print a final copy. This process requires only one hard copy, the final. However, some authors, like some editors, prefer to proof from a hard copy. This method usually is mandatory for long documents and is unavoidable when you must take work home.

Unique problems arise when both the author and the editor are working on the same document but using different disks. For instance, it is easy to inadvertently print an early version rather than the most recent one. If the author and editor communicate often about the status of a document, particularly who has done what when, this problem should be minimized. When multiple versions are expected, the editor can maintain a status sheet that shows what has been done, when it was done, and who did it. In fact, this information can be easily stored on your disk, so that at a glance the author and editor can see the document's status and what needs to be done next.

HOW DID WE EVER GET ALONG WITHOUT IT?

Among the many advantages to editing on a word processor are the time and money that can be saved (in most organizations time is money). No longer is it necessary to retype a complete page, and possibly several, because you or the author need to add a sentence. Simply type it in at the appropriate place then print the document. As mentioned earlier, you can even eliminate all hard copies except the final one. No longer must you or the author wait for a harried secretary to type your changes; you do it yourself and on your schedule. When you can correct your own work, gone too is the guilt that comes from asking an overworked coworker to redo something that you should have noticed a week ago.

Scalpel, Please.......

There are those occasional documents that can be saved only by major surgery. This is the type of reorganization for which editors ultimately resort to scissors and tape before even beginning to edit the text. Several permutations later, the paper is in shreds, as is the editor's temper. The word processor's cut and paste option can function marvelously here. Nothing is lost on the floor or in the wastebasket. With the stroke of several keys, you can move anything from a sentence to a chapter. You can transfer it entirely to another disk or merely copy it into another part of the same document. When necessary, it is also possible to delete paragraphs, pages, or entire sections using the same method.

Help Save a Tree!

The difficulties encountered in editing reports written by more than a dozen authors are fairly well known. There are multiple versions of the draft, each author must have the opportunity to read each iteration, and several levels of management often are asked to review each step. The result is a single final manuscript and a mountain of marked-up drafts. The word processor/computer with multiple terminals may yet save the forests of the world. Authors, management, and editor can use terminals at the individual input stage; through several iterations involving editing, comments, and corrections; and during the final reading of the manuscript. Zealous use of backup diskettes at each stage is advisable, however, and guidelines should be developed so that all parties are aware of the procedures.

Imagine Spelling It Right the First Time!

An author writes happily and at great length about his work with tris-dimethylbypyridene. Another author is proud of her 3-trifluoromethylbenzoate reports and a-a-a-trifluoro-o-toluate research. You, on the other hand, must suffer their quite justifiable wrath if you accidentally omit a syllable or three from these words. Heaven bless the word processor's abbreviation library, which allows you to store the correctly spelled word and retrieve it when necessary. Frequently used and complicated equations that take an eternity to type now appear in a flash. An often used abstract or short bibliography can be stored similarly in the document library. When one is needed, simply press several keys and there it is!

The Global Search vs Human Error

It happens to everyone. You have edited 123 pages of a 215-page document and suddenly a possibly misspelled word or newly hyphenated construction appears. Because you can't remember all the previous occurrences of that particular use from last Friday afternoon or a week ago Tuesday, you must leaf through the edited pages again, possibly missing several instances. The word processor's search capability is one of its greatest gifts to the editor. In one mode it will automatically search and replace a word or phrase throughout the document; in another mode it will locate each use of the word or phrase and stop to allow the editor to make the decision—perfect for those noun-becomes-adjective situations.

WHAT NEXT?

Now we are ready (almost) to tackle other areas, particularly the visual aspects of document preparation. For those who usually operate without a designer's help and without photocomposition capabilities, the flexibility of word processors can be extremely useful in page design, layout, and tables. As we make the most of our word processors, we also will be expanding our own skills: generating new ideas, finding shortcuts, and enjoying the added versatility of our jobs.

If we appear supremely confident of our skills with this new way to edit, do not be misled. We too are still learning. We have conquered our initial trepidation, and we have mastered the general mechanics of the equipment. We have even encountered and solved some basic problems. However, at this time neither of us is ready to relinquish entirely the comfortable familiarity of paper and red pen. We must be realistic in our assessment of which tasks are accomplished best by traditional methods and which should use our new mechanical skills. For example, until we develop greater confidence, both of us prefer to use hard copy for the final reading of a document that is going to press. For quick edits of short items and drafts, we are quite at ease with the word processor.

Whether you are impatiently waiting to learn or being bullied into it, you will find that editing on a word processor is not as alarming as you might anticipate. Although initially you may resent the time spent learning new methods for old tasks, you soon will be pleased with your competence. The word processor is generally a very forgiving system; it responds well to perseverance and (if you can manage it) patience. Above all, it is flexible. Your individual editorial requirements obviously will dictate what you ask of your equipment and yourself. Just because the manual does not list a process that you may need, do not feel stymied. With persistent effort you might invent a new capability. If we two rather old-fashioned editors can join the twentieth century, so can you.

ACKNOWLEDGMENT

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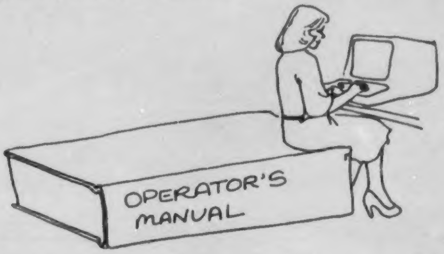

You too can get on top of the word processor challenge.

Dynamic Online Editing: A Proposal

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ABSTRACT

Editors are caught between managers' requests for more efficient production and writers' fears of authoritarian editing. What can we do concerning automation? One solution is for editors to design the computer program that would serve as the editor's own tool. If we do it right, we may welcome giving up our pens for a more efficient means of correcting errors, suggesting style changes, questioning technical points, referring to guidelines, and testing layouts.

In this paper I describe such a tool. The eight features that I propose the tool include are: file-copying capability, multiple screen settings, colored commentary, phrase highlighting, style guidelines retrieval, notations in windows, light pens, and graphic manipulation. Who knows? Perhaps the light pen is mightier than both the sword and the ink pen.

INTRODUCTION

The transformation from typewriter to word processor has been relatively easy for most writers. With functions that delete, insert, move, format, proofread, and store text, the computer has been welcomed as a new, time-saving tool. To varying degrees writers have learned to compose in their new medium and abandon paper and pen. Nothing beats the clean, neatly formatted draft for reinforcing a writer's efforts.

Usually the last person in a technical writing department to convert to using a computer or word processor is the editor. It is very hard to get editors to give up their pens and fully computerize their operation. The weaning will be easier though if good editing techniques can be followed on the computer. Thus, editors who have seen what computers can do for the writing process should help design an online editing tool they can use.

I can hear the roar of protests already. How can the technical editor put away the marking pen? Isn't editing synonymous with marking up a draft on paper? My answer is a resounding "NO!" If writers can enter the computer age, so can editors!

Editor-writer Relationship

Already numerous word processing programs for writers are available. As writers' tools they help in revising, proofreading, and laying out a document. But with most such programs, changes to a text are complete and final. The original writing file is destroyed. Unlike editing for a newspaper, many technical editors do not assume an authoritarian role when reviewing someone's draft. Instead, the editor carefully preserves the original text until the writer can be consulted about editorial changes. As in the early days of publishing, the editor marks up rough drafts or galleys with a colored pen or pencil. For such a negotiating editor, changing someone's computer file could destroy the special relationship with the writer.

As someone who has been both a writer and an editor, I understand the importance of preserving the writer's ownership. What measures can be taken in word processing to preserve that sense of authorship?

BASIC REQUIREMENTS

Based on word processors and text editors I have used, I am proposing options for the editor's menu. Some of these techniques may seem advanced depending on the word processor you currently use. Nevertheless, many exist and can be adapted to our needs. The choice is ours. We can control the machines we use to expand our abilities and gain more respect for the editor, or we can be controlled by fancy machine "editors" and possibly even replaced!

My requirements for a good online editor's tool are:

- File-copying capability
- Multiple screen settings
- Colored commentary
- Phrase highlighting
- Style guidelines retrieval
- Notations in windows
- Light pens
- Graphics manipulation.

This list of features is my technological fantasy for editing in 1984 and beyond. Some of these features I use now because they are already available on the computer system I have. Others I hope to develop for future use.

File-copying Capability

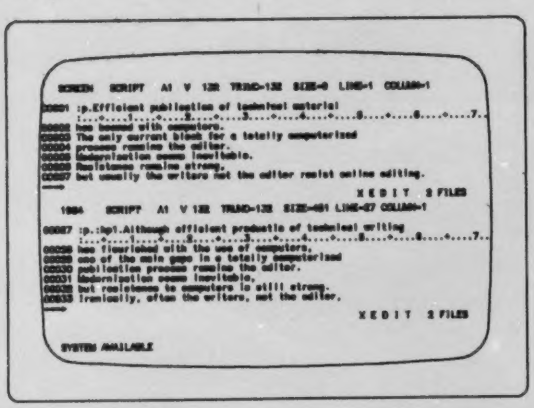
Most word-processing systems allow files to be copied. This capability is an important part of online editing. The author can send a copy of his file to the editor and still preserve the original. In some cases the writer and editor can agree that the editor will have access to the writer's file at the editor's convenience. Under another arrangement, files can be placed in a common "pool." But privacy must be considered. And above all, the original document must be preserved.

The file the editor works with could be named "Edit1" to distinquish it from the original(1). Once the writer has reviewed the editor's recommendations, the revised file can be renamed "Draft2" and the original file discarded. This process of copying, revising, and renaming can continue as long as the writer and editor are working on a draft.

Publication departments define the relationship between the writer and editor differently. Yet the major concern most editors express about online editing is that writers will never allow their files to be irrevocably changed. *Files do not have to be changed.* As editors experiment with more of the functions of word processing, they can negotiate with writers about how to access computer files. New screen capabilities would make negotiating easier.

Multiple Screen Settings

Screens can be divided vertically or horizontally into multiple sections to display different information. Separate files can be shown on a split screen simultaneously. Then a writer can compare the original and edited draft on one screen as shown in Figure 1.



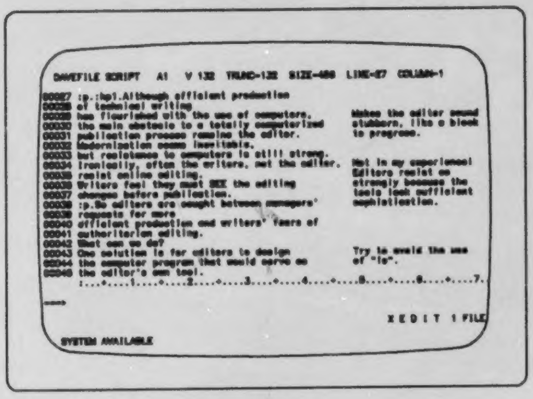
```
SCREEN   SCRIPT   A1  V 132  TRUNC=132  SIZE=0  LINE=1  COLUMN=1
00001 :p.Efficient publication of technical material
      :...+....1....+....2....+....3....+....4....+....5....+....6....+....7..
00002 has boomed with computers.
00003 The only current block for a totally computerized
00004 process remains the editor.
00005 Modernization seems inevitable.
00006 Resistance remains strong,
00007 but usually the writers not the editor resist online editing.
---->
                                                    X E D I T   2 FILES
  1984   SCRIPT   A1  V 132  TRUNC=132  SIZE=401 LINE=27 COLUMN=1
00027 :p.:hp1.Although efficient productio of technical writing
      :...+....1....+....2....+....3....+....4....+....5....+....6....+....7..
00028 has flourished with the use of computers,
00029 one of the main gaps in a totally computerized
00030 publication process remains the editor.
00031 Modernization seems inevitable,
00032 but resistance to computers is still strong.
00033 Ironically, often the writers, not the editor,
---->
                                                    X E D I T   2 FILES

 SYSTEM AVAILABLE
```

Figure 1. Comparing Files on a Split Screen.

Using the split-screen technique alone, the editor preserves all the writer's original work, but comparing files line by line is time-consuming. Something else is needed.

Often editors point out important style changes by making comments in the margins. Multiple screen settings could also permit this technique. An editor could key in commentary in the "margin" of a divided screen as illustrated in Figure 2.



```
DAVEFILE SCRIPT   A1   V 132  TRUNC=132  SIZE=400  LINE=27  COLUMN=1
00027 :p.:hp1.Although efficient production
00028 of technical writing
00029 has flourished with the use of computers.      Makes the editor sound
00030 the main obstacle to a totally computerized    stubborn, like a block
00031 publication process remains the editor.        to progress.
00032 Modernization seems inevitable.
00033 but resistance to computers is still strong.
00034 Ironically, often the writers, not the editor.  Not in my experience!
00035 resist online editing.                         Editors resist so
00036 Writers feel they must SEE the editing         strongly because the
00037 changes before publication.                    tools lack sufficient
00038 :p.So editors are caught between managers'     sophistication.
00039 requests for more
00040 efficient production and writers' fears of
00041 authoritarian editing.
00042 What can we do?
00043 One solution is for editors to design          Try to avoid the use
00044 the computer program that would serve as       of "is".
00045 the editor's own tool.
      :...+....1....+....2....+....3....+....4....+....5....+....6....+....7.

---->
                                                          X E D I T  1 FILE

  SYSTEM AVAILABLE
```

Figure 2. Margin Comments on Divided Screen.

As in editing with a pen, writers would have a chance to evaluate the editor's suggestions. The editor could make a general comment about problems throughout a text without marking every instance where they occur. For example, the editor could question the writer's use of the passive or recommend the use of analogies. The marginal comments can also refer a writer to references (style manual, grammar handbook, thesaurus, dictionary).

Editors who prefer to "footnote" comments using a separate sheet of paper could create a separate file for comments which the writers could view using a single or split screen. Some editors who work online put comments in brackets within the text and let the writers delete them. But a margin makes relating comments and text convenient. In fact, it is the one editing tool that I feel MUST be provided for effective online editing.

Multiple screen settings allow users to view a text in several ways. The editor may insert comments with the text in the margin format, but might prefer making editorial changes with the text in a full-screen format. Moreover, the writer can also view the edited text in either format. In addition, many word processors display the text as it will appear in print, that is, without the computer directions for paragraphing, lists, graphics, and typography. The ability to choose and change the way the text is displayed makes both writing and editing with computers more efficient than using pen, typewriter, or typesetter.

As editors, we are accustomed to writing comments, and each of us probably has a unique method. Computers can provide the same capabilities electronically. In addition, with some computer systems the comments can be displayed in vivid colors.

Colored Commentary

Many terminals can display colored text. Some editors use different colors to comment on different types of writing problems. For example, the editor questions technical points in red, word choice in green, guideline deviations in purple, and style in blue. A good, online editing tool used with multi-color terminals would provide the same variety.

An alternative to color display is symbolic markers. The editor could use asterisks before some comments and dollar signs before others. The main idea is that what editors do with pens can be done in some form online. We may have to be inventive in adapting our computer system, but many possibilities are available.

Phrase Highlighting

With colored pen or pencil, it is easy to direct the writer's attention to a word, phrase, or section that needs to be changed. The editor can use arrows, circles, underlining, or copyediting marks. Resistance to online editing has been promoted by the difficulty in distinguishing original text from altered text. One solution to this problem involves electronic highlighting.

On a one-color display terminal, a program can be used that makes some lines of text appear brighter that others. This feature could be adapted to editing. Using special commands the editor could make changes that would appear highlighted when the writer reviews the edited file on the screen. Such highlighting would have no effect on a printout of the text. In addition, a writer could use the split-screen function to view both the original and edited version simultaneously.

Similarly, multi-color display terminals could show editorial changes in a different color from the original text. The color of recommended changes could even match the color of related comments in the margin.

Basically, the computer can be used to get the writer's attention effectively. With multi-color displays, color schemes for organizing comments and changes can enliven text. However, real life is dynamic. With the capacity to change what appears on the screen quickly, computers can be more dynamic than the printed page. In the following sections, I will describe some of the dynamic possibilities for editing.

Style Guidelines Retrieval

Editors must keep up with changing publication guidelines or revisions in house rules. Rather than wait for the latest edition of the style guidelines, an editor could proofread for compliance more effectively if the guidelines were kept "on the system."

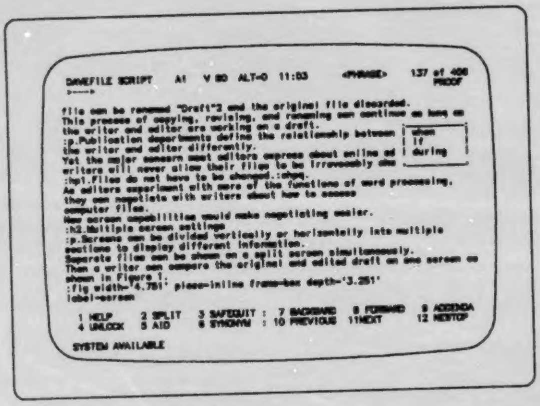
Such a system would require cooperation throughout a company. The guideline writers might have to provide hard and soft copies in the beginning. Such a changeover to online publication would involve a lot of work at first; however, announcing revisions would be easier and quicker once the guidelines are on the system. An alternative would be for the individual editor to store the guidelines in a file. Such a job would be valuable but onerous.

Nevertheless, if the guidelines can be retrieved on the computer, efficiency can increase for writers and especially for editors. It is very important, though, for the indexing or cross-referencing to be well planned. The guidelines are useless if no one can access them.

Once all these problems are worked out, the editor can cite the guidelines in his comments. With a dynamic program, the writer could request the guideline be displayed on the screen while reviewing the edited draft. The computer would temporarily store the text and display the guidelines. Then with another command, it would return the text to the screen. Such changes to the displayed text begin to bring new dynamics to the editing process.

Notations in Windows

Another dynamic approach to changing the display on the screen is to create a temporary "window" or box within the text, as shown in Figure 3.



```
DAVEFILE SCRIPT   A1   V 80  ALT=0  11:03     <PHRASE>     137 of 408
                                                             PROOF
>---->
file can be renamed "Draft"2 and the original file discarded.
This process of copying, revising, and renaming can continue as long as
the writer and editor are working on a draft.                 | when   |
:p.Publication departments define the relationship between   | if     |
the writer and editor differently.                            | during |
Yet the major concern most editors express about online ed
writers will never allow their files to be irrevocably cha
:hp1.Files do not have to be changed.:ehp1.
As editors experiment with more of the functions of word processing,
they can negotiate with writers about how to access
computer files.
New screen capabilities would make negotiating easier.
:h2.Multiple screen settings
:p.Screens can be divided vertically or horizontally into multiple
sections to display different information.
Separate files can be shown on a split screen simultaneously.
Then a writer can compare the original and edited draft on one screen as
shown in Figure 1.
:fig width='4.75i' place=inline frame=box depth='3.25i'
label=screen

 1 HELP     2 SPLIT   3 SAFEQUIT :  7 BACKWARD   8 FORWARD   9 ADDENDA
 4 UNLOCK   5 AID     6 SYNONYM  : 10 PREVIOUS  11NEXT      12 NEXTOP

SYSTEM AVAILABLE
```

Figure 3. A Window within the Text.

The window approach is even more dynamic than changing the whole screen. With a single command, a box appears above or below the section in the text that concerns the writer. The editor could either compose what appears in the box or copy information from another file such as the guidelines. Then with another command, the box would disappear and the original text reappear.

Programs for proofreading and analyzing reading grade levels already make use of windows to suggest correct spelling possibilities and synonyms for words. What appears in the box depends on what the editor wants to tell or illustrate for the writer. The choices are unlimited.

As a communication tool, the window is useful. It does not change the original text; that job is left to the writer after seeing the editor's reasons for recommending a change. It gets the writer's attention. It is dynamic. In fact, it could be more dynamic.

Borrowing concepts from videogame programs, an online editing tool could actually turn the text into a moving picture. As the writer moves the cursor from line to line, various windows with the editor's comments or changes could appear. Or with some special programming, the windows could appear automatically at a predetermined speed. The writer could make the program pause at any point to read a comment or consider a change more closely. Computers offer editors new wizardry. We just have to design the applications.

Light Pens

For the editors who just are not comfortable without a pen in their hand, there is the light pen. Light pens work on special display screens sending commands to the computer by touch. The engineering is sophisticated but already on the market.

For the editor, the light pen could make marking up a file quicker than typing commands. By touching an area on the screen where the text is and then touching a menu area of the screen with the light pen, commands could be issued and changes made in the text as illustrated in Figure 4.

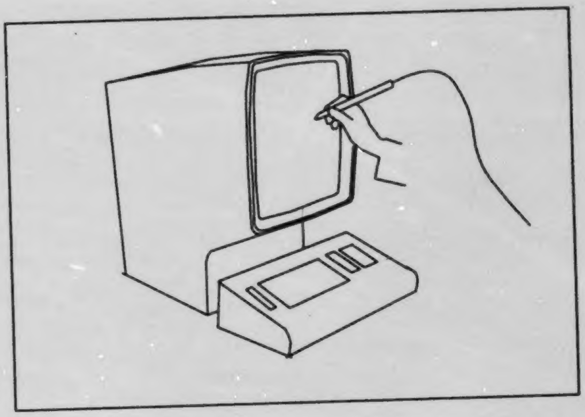


Figure 4. Using the Light Pen.

What appears in the menu area would depend on the editor's design. For example, verb agreement, words often confused, capitalization, and punctuation changes could be programmed to occur at the touch of a light pen. Even standard comments, style guidelines, and grammar rules could be programmed to appear between the lines or in a box within the text.

For the writer using the light pen, touching a highlighted phrase could issue the command for the window with the editor's comment or a guideline to appear. All such comments would have to be entered by the editor first. Mainly, the light pen would make reviewing and revising more convenient.

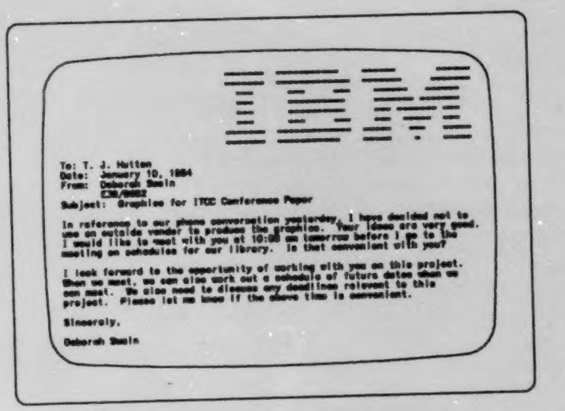
Marking up the text on the screen by "drawing" with the light pen is another approach. Wide spaces between the lines and a different color for the light pen's marks make such a system feasible. Although interesting, this method alone would not take advantage of the dynamic possibilities of the computer. But it could be used in combination with style guideline retrieval, and a program that would convert the marks to text changes automatically.

Other uses of the light pen involve the graphics, layout, and organization. Whole blocks of text might be rearranged on the page or changed in size. As editors become more involved with the graphic design of a technical publication, computers will be indispensible.

Ultimately, a touch-panel system would eliminate the need even for the light pen. With touch panels, the screen displays graphic symbols or text, and the user simply touches a screen with the finger or a normal pen to direct the computer to perform an operation. Technology continues to offer editors convenient tools, but again editors must express specific needs to get the most appropriate design. In the case of touch panels, editors might determine which symbols or text and where they should be placed on the screen.

Graphics Manipulation

Often the problem with a text is not the writing itself, but the way it looks on a page. With advanced programs, the layout of a page could be pictured on the screen in another format of the text, as shown in Figure 5.



To: T. J. Hutton
Date: January 10, 1984
From: Deborah Swain
[illegible]
Subject: Graphics for ITCC Conference Paper

In reference to our phone conversation yesterday, I have decided not to
use an outside vendor to produce the graphics. Your ideas are very good.
I would like to meet with you at 10:00 am tomorrow before I go to the
meeting on schedules for our library. Is that convenient with you?

I look forward to the opportunity of working with you on this project.
When we meet, we can also work out a schedule of future dates when we
can meet. We also need to discuss any deadlines relevant to this
project. Please let me know if the above time is convenient.

Sincerely,

Deborah Swain

Figure 5. Viewing the Layout.

By previewing such designs, the editor and writer avoid the high production costs of reprinting. In addition, various layouts can be experimented with before anything is printed or illustrated.

The editor can propose changes in the layout for one page or a whole book using a copy of the writer's file. Whether an illustration should come above, beside, or below the text can be considered. What style and size type would do the best job can be considered, too.

As with the other online editing proposals, the writer can key in a command to see the revised layout, have a box appear, or view both layouts on a split screen. The choices are still up to the innovative editor who realizes the computer is a tool, not a threat to job security.

CONCLUSION

This paper is just a proposal. There are other options. I would be interested in hearing how other editors adapt different computerized functions to the needs of the job. The possibilities are almost unlimited for an online tool that technical writers, editors-- and communication teachers could use. (Many of these online editing tools could be adapted to classroom use.)

The main point is that we have been talking about online editing for years. What do we want to do about it? What have some of us already done? If we are seriously looking to the future, we must get closer to our computer tools and design new ones.

Can we really give up pen and paper if our final product is printed? Probably we can although old habits will be hard to break. But will all our information products be printed in the future? Some of us are already developing products for the screen, not the printed page. Thus, for many writers online editing has already replaced marking up drafts with a pen.

As editors, we can see that our profession needs to grow in stature. Many managers do not understand what we do. Of course, computers can proofread, but we all know they cannot edit. Only people can edit. With the help of good editing tools, we can become more efficient at marking drafts and have more time for our other planning and training responsibilities. Finally, editing online can preserve and even strengthen the atmosphere of cooperation that technical writers and editors enjoy.

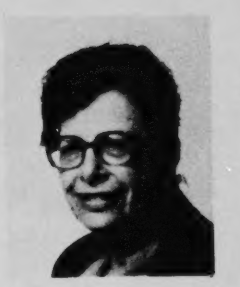
I hope this paper encourages future development in electronic editing. Some day the editor may be the first in a writing department to get a computer, and the one who uses it the most!

REFERENCES

(1) Morgan, Jim. "For Your 'Edit'-ification," *Technical Communication*, STC, Third Quarter, 1983, p.26. Since the essay is reprinted from a 1982 chapter newsletter, it is reassuring to read about writing departments that have already successfully adapted computer systems to their online editing needs.

Testing Technical Documents

Esther A. Spachner, Moderator



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Two methods of testing documents in advance of publication are presented, one a formal inspection by technical experts to discover errors, and the other a laboratory test in which a representative user attempts to perform a task by following the instructions in a technical document. The laboratory test is considered from the perspectives of the writer and the test administrator, in two separate papers. Both methods of testing are designed to increase the quality and usability of a document, and avoid costly revision and reprinting of documents to correct defects.

Anyone who doubts that new measures are warranted to test the usability of a document before it is in the hands of the user need only recall the legend of the master chef who inadvertently omitted yeast in a recipe for bread. The novice baker who followed the chef's instructions to the letter produced a solid brick instead of a loaf of bread, for without yeast, the dough would not rise.

While this tale may evoke a chuckle, a different response would be forthcoming if the product were a parachute instead of a loaf of bread and the instructions too flawed or incomplete to enable the jumper to apply them in time.

These example point up the need for a means of testing and usability of a technical document *before* it is published. This will not only help to avoid hazards to the user, but also avoid the effort and cost of revising and redistributing a published document simply because discoverable flaws were overlooked the first time around.

The two methods of testing presented by the panelists — information inspection by technical experts and user testing in a laboratory — are designed to increase the value of a technical manual by making it easy to understand, complete, consistent, and accurate. In both types of testing, the document writer participates in the test, but does not conduct it so as to preserve his objectivity.

The paper on information inspection describes a well-planned technical review that is designed to locate defects, rather than repair them, in each complete draft of a document. While the reviewers consider all potential defects on an individual basis, they discuss the defects as a team, and are able to reach a "higher level of error detection," in our author's words, because of the group discussion. The reviewers are also available at the same meeting to answer the writer's questions on their findings to solve any problems that may be revealed. Writers are held accountable to their reviewers: they must report the disposition of each defect to the inspector, and if they decide that no change is necessary, the inspector can take the matter up with a higher authority, who will act as judge. The inspection process ends with verification that all defects have, indeed, been corrected.

In the other two papers presented by this panel, the direct user test is administered to determine whether the information needed can be found in the document, and whether the task can be performed from the description easily and without user confusion. Unlike the information inspection, the user test examines only selected portions of the document and the test subjects are like the eventual user. In fact, the test subjects are carefully chosen for their similarity in background and experience to first-time users of the product.

The heart of the test is the selected subject actually performing the task after reading the instructions. he is guided by the test administrator, while the writer and other interested observers view the subject through a one-way window. The subject's performance is recorded on videotape and the writer's verbal observations are annotated by a monitor to assure the writer's total concentration on the task performance.

But far more is involved in the testing process, especially for the test administrator; to name a few, the selection of both the subjects and the portions of the document to be tested, preparation of written materials for the test, follow-up on problems disclosed by the test, and application of the test results.

The panelists in this session present a plan outlining all the considerations involved in the laboratory tests, including the number and types of people needed to provide the test, the test facilities and equipment, the use of test results, legal issues, and even a simple method of protecting the test subject's identity.

The ideas presented in this workshop form a framework for usability tests of manuals and other technical documents, and are intended to stimulate others to formulate their own plans for a most important stage in testing documents which is all too often neglected.

Information Inspections

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Abstract

This paper tells about a method for monitoring conformance to requirements during the planning and writing cycle. The method is called "information inspections."

The paper describes the information development process into which information inspections fit. Next, it defines information inspections and lists the six steps common to each inspection. It contrasts information inspections with the ordinary review process and lists three caveats for everyone involved. Next, the paper defines the roles of the inspection participants. The overview portion of the paper concludes by describing the gains from information inspections that accrue for the audience, writers, and managers.

The body of the paper presents details about the timing of inspections and the interaction of all the participants in each of the inspection steps.

Overview

What Is An Inspection?

A better question might be, "What is the inspection process?" Inspections don't happen in a vacuum. They are part of a larger information development process that includes:

- Describing the users, the product, and what the users will do with the product (their "tasks")
- Writing information objectives to support the defined tasks
- Responding to the information objectives with information specifications
- Inspecting and revising the information objectives and specifications
- Writing information content plans (detailed outlines)
- Inspecting the content plans
- Writing, inspecting, testing, and producing the publications
- Maintaining the publications

The inspection portion of the development process includes (for each inspection) the following six activities:

Planning: scheduling the inspection into the development plan

Distribution: distributing the inspection materials and educating the inspectors about them

Preparation: studying the inspection material to understand it thoroughly

Inspection meeting: identifying potential defects in the inspection material

Rework: correcting the defects

Follow-up: verifying that the defects have been fixed.

Well, that's all fine. But what *is* an information inspection?

> An *information inspection* is a formal examination of a document by qualified inspectors to ensure that the document is clear, easy to use, accurate, complete, and conforms to the information plan.

How Are Inspections Different From Reviews?

That doesn't sound much different from the reviews we've always used, and it is not. But the differences that exist are important.

First, rather than focus on solutions to defects found by reviewers, inspections focus on documenting defects found by inspectors and on finding other defects during the inspection meeting.

Second, inspections are led by a moderator who has specific duties in the meeting. The author is able to think and respond to the other inspectors, free from keeping records and running the meeting.

Third, inspections have entry and exit criteria. This means that inspectors can expect to find uniformity throughout the development and inspection cycle. For example, a draft must always have been edited or it is simply not ready to be inspected. Similarly, after the inspection meeting is over, the author must fix the defects found in the inspection, or the draft cannot exit from the inspection.

Fourth, the inspection moderator follows up to verify that defects have been fixed. This ensures not only that the author doesn't miss anything, but also that the appropriate people help fix the problems. Responsibilities are more firmly fixed and cooperation is more formally ensured.

The fifth major difference between inspections and reviews is in the use of statistics resulting from the inspections. After each inspection meeting, the moderator classifies and records the defects. As the numbers accumulate from many inspections, managers and writers can use them to find and fix flaws in the development process itself. This kind of systematic quality improvement was never possible before because the reviews resulted in no statistics.

Now that you know generally what inspections are, you should also know what they are *not*.

First, inspections are not a means to change the information plan. Writers write their books according to the information plan, which has also been inspected. Draft inspections should ensure that the inspected document meets the plan. Inspectors who disagree with the plan should press their arguments through their own management or through the writing manager, but *not* through the writer at an inspection.

Second, inspections are not a forum to criticize or change system or program design or implementation; that forum is the design or code inspection for the product. Information inspections merely ensure the accuracy of the author's interpretation; design changes should be handled through normal design change procedures. Of course, design deficiencies may be discovered at information inspections, and the changes that result from the discoveries will eventually affect the writer's product. That's just business as usual.

Finally, inspections are not writers' trials; their purpose is to discover errors, not to assign blame. Professional writers of all kinds welcome valid criticisms to improve their work; inspections are a proven method to improve the quality of the criticism. Writers need not fear that managers will use inspection results in performance evaluations; managers are concerned with the effectiveness of the defect removal process, not with the defects that are found. Happy is the manager whose people find their errors and fix them rather than expose them to the world in printed publications. And, happy also is the writer whose work improves with the honest criticism of information inspections.

Who Does What?

Each person involved in inspections has very specific things to do. The functions are described in detail later in this document, but briefly the roles are these:

Coordinators: The inspection coordinator is appointed by the manager to implement and monitor inspections in the department. The coordinator works with the manager to decide what will be inspected, who will do it, and when it will be done. He or she also trains and assign moderators, keeps statistics that result from inspections, and reports those statistics to management and other interested people.

Moderator: The moderator keeps the inspection meeting moving by limiting discussion to the document being inspected. The moderator also collects potential defect report forms and judges (at the end of a meeting) whether a reinspection is necessary. Moderators are trained to moderate; they are usually members of the writing department.

Author: The author of the manual to be inspected helps define the inspection schedule and choose the inspectors. If several people have written the manual, the lead writer acts as the author for the inspection. The author provides the draft copies to be inspected.

At the inspection meeting, the author helps evaluate potential defects and responds to questions from the inspectors. After the meeting, the author corrects the defects and shows the moderator how they have been fixed.

Inspectors: Inspectors are invited experts from Engineering, Programming, Product Assurance, Field Engineering, Planning, and other interested groups. They are chosen for their specific involvement with the product or its users. Of course, not all inspectors inspect all publications. For example, Field Engineering people are much better inspectors for program service guides than for application programming references. They would most likely be invited, therefore, to inspect program service guides.

Ideally, inspectors would inspect only the portions of manuals about which they have direct knowledge. Actually, inspectors often represent other reviewers by adding the reviewers' comments to their own and citing them as potential defects during the meeting. The inspector must therefore understand the absent reviewer's comments and be able to discuss them during the meeting.

For the sake of continuity and to eliminate redundant discussions at different inspection meetings, the same inspectors should inspect a manual throughout its development.

Manager: Although inspections do not require much active participation from managers, they do require their active support. Managers ensure that the necessary time and people are available during each inspection step throughout the entire development cycle. Managers should not attend inspection meetings; they must recognize that their presence can inhibit some of the inspectors.

What Do We Gain From Inspections?

The people who gain most from our inspections are the users of our books. Inspections promote consistency of format, style, preparation, and presentation. Users can expect to find the same kinds of information presented the same way in the same place, no matter what set of publications they are using; the information is clear, complete, and easy to use.

Naturally, we want to please our users. How fortunate that at the same time we can also please ourselves. Writers, editors, developers, assurers, and managers all gain from inspections. Here's how.

Inspections practically eliminate surprises. As a manual progresses from the preliminary objectives to planning, writing, and editing and finally to the last draft, everyone involved in the project must be satisfied that the manual meets requirements. No deviations, no exceptions, and no huge chunks of work "discovered" at a final draft review meeting. And no acrimonious finger-pointing about who should have caught what, when.

Managers who have used inspections like them as a management tool. Product development managers like inspections because they can more accurately estimate the amount of time their key people will have to spend reviewing manuals. Assurance managers like them because they provide a uniform method of finding and fixing errors. And Information Development managers like inspections because of both the quality improvements and the personnel development.

Let's Get Specific

This section tells when the various inspections should be held and describes the mechanics of the inspection process.

Timing

Because inspections are part of the larger development cycle, they must occur within that cycle. The information plan is inspected twice: once when the information objectives and specifications are complete and again when the content plans are available to complete the information plan. These inspections are called II0 and II1, respectively. ("II" means Information Inspection.) The first and final drafts of each manual are inspected in the II2 and II3 inspections. The following chart is a guideline for scheduling the inspections into the information development cycle.

Inspection	**Preparation Rate**	**Inspection Rate**	**Rework Rate**
Information Objectives & Specs. (II0)	7 pages/day	15 pages/hr	0.75 hr/error
Completed Information Plan (II1)	7 pages/day	15 pages/hr	0.75 hr/error
Drafts (II2 - II3)	40 pages/day	75 pages/hr	0.50 hr/error

Using these figures for a 35-page information plan at II1, you would allow five or six days for preparation, then schedule a conference room for two hours for the inspection meeting. For a 300-page draft, you would allow the inspectors about two weeks to prepare, then schedule a two-part (morning and afternoon) inspection meeting. The rework time should be scheduled into the next draft's writing time. Remember, there will probably be more errors to correct than you're used to with the old review method, so allow a little more time between drafts when you first define a manual's schedule.

The moderator can call for a reinspection if there are many defects found or if the ones found are particularly serious or require an extraordinary amount of rework. Moderators are reluctant to require reinspections because they can disrupt a project, but the exit criteria must be satisfied and sometimes the reinspection is necessary. Reinspections, however, usually cover only those portions of the plan or draft that were most affected by the inspection. They therefore take much less time than a full inspection. If the material was particularly hard-hit, however, a complete reinspection may be necessary.

The Process

Although I don't have enough space in this paper to describe all of the responsibilities of everybody involved in inspections, we can take a close look at the six steps of the cycle to see how they all fit together.

Step 1. Planning

In this step—essentially a scheduling step—the coordinator and manager decide what will be inspected, who will inspect, how the inspections will fit into the development plan, and how defects will be reported and recorded. Then, on an ongoing basis, the coordinator schedules the date, time, and place for each overview and inspection meeting.

The author prepares the inspection materials.

The moderator verifies that the inspection materials meet the entry rules for this inspection.

Step 2. Distribution

Distribution is accomplished either through an overview meeting or personally by the author. In an overview meeting, the moderator explains the upcoming inspection meeting. He introduces the participants and then educates the inspectors about the moderator's and their own roles. Next, the moderator explains the rules for this inspection. For example, he or she tells how to record potential defects and what to bring to the meeting.

The author talks about the material to be inspected and distributes it along with some blank defect forms. For example, the author might describe the user and tasks supported, then explain chapter-by-chapter how the manual should be used to accomplish the task.

The inspectors listen and ask questions. They use the overview meeting, not the inspection meeting, to clear away any fog that shrouds the material to be inspected.

Overviews are not limited to inspectors. Sometimes, people who would like to know more about a particular plan or draft might want to attend. That's OK. The overview is an information-giving, not an information-getting meeting and you can invite whomever you please.

Overview meetings are relatively long at the beginning of a project. They may be omitted altogether as the participants become more deeply involved in the material.

Step 3. Preparation

In this step (think of preparation as study time), the inspectors and the moderator become thoroughly familiar with the inspection materials. They prepare, or study, in two ways. (1) They mark up the materials to note what to bring up during the inspection meeting. (2) They record all outright errors, discrepancies, and omissions on potential defect report forms to discuss and submit at the meeting.

The moderator also plans how the material will be inspected. For example, in a program service guide inspection meeting, the moderator may plan either to trace the manual in sequential page order or to trace it in logical order through each problem symptom path.

Two or more weeks are normally scheduled for preparation, although actual preparation usually takes less than a week. This allows the inspectors to fit the preparation in with their other work.

Step 4. Inspection Meeting

The inspection meeting is a working meeting with two objectives: one, to identify potential defects, and two, to decide if the material passes the inspection.

The moderator begins by determining if all inspectors are prepared and by recording the number of hours each inspector spent preparing. Next, he describes the sequence in which the material will be inspected, then begins the inspection.

As they progress through the material, the inspectors identify and discuss all of the potential defects they've found. During the discussions, the inspectors become a working team. They corroborate valid defects; they relegate some "major" defects to minor defects (and vice versa); and they disqualify invalid defects. And equally important to all of the preceding work, they ferret out previously unidentified defects. It is this piece of work that characterizes an *effective* inspection. Without it, inspectors could just as well mail in their defect report forms. With it, inspectors reach a higher level of error detection.

Sometimes, the correction for a defect is obvious and the inspectors can supply it in the meeting. However, when the correction is less obvious, the inspectors must help the author identify the best candidates to supply the answer. Doing this helps eliminate fruitless solution hunting in the meeting and helps the author to minimize rework time.

Besides finding potential defects, the inspectors have another responsibility. They need to report the defects in a positive, constructive, helpful way. They need to work *with*, not against, the author. And, as tempting as it may be, they need to refrain from judging the author's work.

The author does not try to defend or explain away defects. Instead, he answers technical questions and understands each of the defects submitted. (Conscientious authors even identify and submit potential defects on their own material.)

As the defects are detected, discussed, and accepted as valid, the moderator records them on a master log and collects the inspector's individual potential defect report forms. Also, after all of the defects have been discussed, the inspectors give the author their marked-up drafts.

At the end of the meeting, the moderator recaps the defects and decides whether the material will need to be reinspected after the reported defects are corrected. This decision is based upon the estimated amount of rework required as a percentage of the original material. The guidelines for reinspection are these:

- For an I0, I1, or I2, if the estimated amount of rework exceeds 30%, the material should be reinspected.
- For an I3, if the estimated amount of rework exceeds 15%, the material should be reinspected.

Although we use a formula to help determine when a reinspection is necessary, the final decision is a matter of judgement. The moderator must decide whether the rework is great enough to introduce a significant number of new defects. That is, are the corrections to the defects straightforward or will they require new development effort by the author? There's no substitute for experience.

Step 5. Rework

In this step, the author investigates and corrects the defects that were submitted on the potential defect report forms and the minor errors that were submitted in the marked-up drafts. The author uses the reverse side of the potential defect report form to describe the full correction (promises to fix are not acceptable), and returns a copy to the moderator.

While investigating a potential defect, the author may discover that no defect actually exists. Similarly, the correction of one defect might eliminate the need to correct another. In any case, an author who intends to reject a defect must inform the inspector who submitted it. The submitting inspector can then either agree with the rejection or escalate the argument to the moderator.

Step 6. Follow-up

This step is a verifying and authorizing step.

Using the completed potential defect report forms, the moderator verifies that all defects have been fixed and classifies each defect by type, such as clarity, missing information, or organization. He or she then completes an inspection summary sheet and gives the whole package to the coordinator.

The moderator mediates any disagreements. When they are resolved, the moderator recommends to the coordinator that the inspection be closed.

If the corrected material needs to be reinspected, the coordinator schedules the reinspection and the inspection steps are repeated. Then the coordinator passes the material, closes the inspection, and tells the author and the author's manager that the material can go ahead to the next phase of development.

The coordinator also uses the inspection summary sheets to analyze the defects uncovered. He prepares summary reports and sends them to managers and authors.

Summary

This has been a brief description of how we use information inspections at IBM in Raleigh. How you use inspections will depend upon your product development process and the people you have available to participate.

Inspections work. They help good writers become better writers. They help managers meet schedules with high quality work. And they help reduce defects early in the planning and writing cycle, when they are cheapest and easiest to fix. Best of all, they help the reader understand and use what we've written, which is our ultimate goal.

THI
AC
MEHLHOP

"Come now, and let us reason together..."

Usability Testing: A Tool for the Technical Writer

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Abstract

Have you ever purchased a product, and with regret realized that the instructions were not very clear or informative? Documentation is the key to marketing a product. The publication that accompanies a product must be accurate and easy-to-use. Technical writers are hired to produce such publications, and a usability test will assist in measuring the accuracy and ease-of-use of these publications.

Usability testing is one of the newest, and most important, tools of technical writing. Although most publications departments are just realizing the significance of testing a publication for usability, the occurrence of usability testing is increasing.

This paper describes the steps of testing a publication. These steps fall into two basic categories: Preliminary measures for testing and the actual testing of a manual in the human factors lab.

This paper also describes the experiences of two writers who observed manuals being tested and the benefits that usability testing can provide.

INTRODUCTION

Usability testing is one of the most useful tools a technical writer has for developing a high quality publication. Eventually, corporations pay a high price for low quality publications, but usability testing helps to eliminate this high price by ensuring that the customer receives error-free and easy-to-use documentation. This paper provides an example of usability testing and illustrates the value of usability testing from a technical writer's perspective.

We will describe the steps involved in testing a publication. Preliminary measures taken before performing a publication test include:

- Defining and choosing tasks
- Defining your audience
- Choosing test subjects
- Preparing scenarios
- Preparing questionnaires
- Preparing documentation.

When the test takes place in the human factors lab, the main concerns are: monitoring the test and benefits of the test.

Throughout this paper, *we* is used to refer to both the authors of this paper and other technical writers in our Information Development group.

When we were approached with the idea of having our manuals tested, our reaction was one of anxiety. We envisioned frustrated readers cursing and crying over our manuals. We soon realized the potential value of the experience and welcomed the opportunity to see how the customers actually use our manuals.

PRELIMINARY MEASURES

We had to complete various preliminary measures before we had our publications tested. These measures include defining and choosing tasks; defining our audience and choosing test subjects; and preparing scenarios, questionnaires, and documentation for the test.

Defining and Choosing Tasks

One of the first steps in planning a publication is to define tasks that the publication will describe. Although this step is usually completed in the early stages of the development of a publication, we had to keep the following elements of this step in mind. We also had to be aware of any changes in these elements, *before* we tested our publications. We included the following in our task definitions:

- Complete description of the task
- Type of people who perform the task
- Frequency of the task
- Relationship of the task to other tasks
- Time necessary to:
  - Learn the task
  - Do the task
- Accuracy required for successful completion of the task
- Amount or kind of assistance needed to complete the task.

After we completed the task definitions, we chose a task to be evaluated in the usability test. Since the testing opportunity is so rare, we chose the most important task for the product. The product developers helped us determine the most important task for the product.

Defining Your Audience and Choosing Test Subjects

Another important step in planning a publication is to define the audience accurately. Like defining tasks, this step is usually completed by the time the writer is ready to test the publication. We kept our audience in mind and tried to be aware of any changes in the following elements of our audience description, before we tested our publications. Our audience definition included the following:

- Physical characteristics
  - Age
  - Body size
  - Limitations
- Cognitive characteristics
  - Job experience
  - Education level
  - Reading level
  - Ability and willingness to learn
  - Turnover rate
- Environmental characteristics
  - Heat
  - Light
  - Space
  - Safety
  - Social contact.

We chose test subjects who match our audience definition. The test subjects may come from your corporation, customer locations, temporary employment agencies, or perhaps local schools and colleges. Our test subjects came from within the IBM Corporation. We tried to choose different types of people as test subjects so that the audience was accurately represented by these subjects.

Preparing Scenarios, Questionnaires, and Documentation for the Test

The next step on the way to testing is preparing scenarios. We tried to write the scenario in a friendly tone so that the subjects would feel comfortable during the test. We listed the steps that the subject had to follow to complete the chosen task. We encountered a problem during the test because the terminology we used in the scenario was not consistent with the terminology in the publication. A test subject became very confused because we referred to a process in the scenario with one term, and then referred to that same process with a different term in the publication.

The technical writers should be allowed to use the product they are documenting, and complete the task described in the scenario to ensure that the task described can be completed successfully. Working through the scenario also gives the technical writer an idea of the time necessary for the subject to complete the task. Because we document a complex product, the product developers helped us in preparing the scenario and then evaluating this scenario.

Questionnaires are useful tools during a usability test, therefore developing the questionnaire is an important part of the testing process. We developed three types of questionnaires:

- background
- evaluation
- debriefing.

We used background questionnaires to obtain descriptive information about our subjects, such as age, education, and previous experience. We used evaluation questionnaires to measure the subject's satisfaction with the product and the information provided. We used debriefing questionnaires to obtain unstructured spontaneous responses to questions about the publication.

The documentation used during the test should closely resemble the publication that the *customer* will use. Using the *current* level of documentation for the test gave us a more accurate illustration of what the customer will experience with our final publications.

USABILITY TEST IN THE HUMAN FACTORS LAB

After we completed all these measures, we were ready to take our publications to the test lab. The test lab we are familiar with is made up of two adjacent rooms: one where the test subject performs the chosen task, and the other where the writer observes the test subject through a one-way glass. The test subject's room should simulate the customer's environment. It should contain the current level of the product on which the test is performed and the corresponding documentation. Because we document a complex *software* product, we were not able to provide the subjects with a current level of the product. Instead, we used a written exercise to test the publications. Lab equipment used to collect data during the usability test is located in the observation room. This equipment includes audio and visual recording equipment and video monitors. The video monitors gave us an up-close view of the subject's actions.

Monitoring the Test

Before each test subject began the test, we explained the test and the scenario. The test subjects were usually a little nervous, so we explained that questions may be asked during the test and that the publication is being tested, not the subject's ability or knowledge. We showed them the observation room, so that they could see what is behind the one-way glass. We encouraged our test subjects to talk aloud during the test, because their comments are helpful. The subjects told us what they were reading and what step in the task they were working on. This situation is much more helpful than just watching the subject flip pages in the publication. Unfortunately, the subjects often felt uncomfortable talking aloud, and instead preferred to write down any comments they had.

In addition to recording data with the audio and visual recording equipment, we recorded data on paper. Having a couple of people assist us with this monitoring was helpful. We familiarized our monitors with the test scenarios and with the types of information they needed to record. The monitors used a stop watch to record the amount of time it took the subject to complete certain subtasks. For example, for each step of the major task, the monitor recorded the amount of time it took the subject to locate the information, read and understand the information, and complete the step. Our monitors also recorded the subject's method of finding the information. While monitors were recording events, we were free to observe the subject's reactions and note any ideas that might help the subject find the information faster, or understand the information more easily. We were also prepared to provide the subject with encouragement and assistance.

After the subject completed the scenarios and debriefing questionnaire, we had an opportunity to discuss his answers. We asked for suggestions for improving our publications and asked questions about some events that occurred during the test. For example, "Why did you refer to the table of contents instead of the index?" The purpose of the debriefing is to discuss the subject's impression of the test. After the debriefing, we were ready to start the test with the next subject.

Benefits of Usability Testing

The purpose of the usability test is to determine what we can change about the publication so that the usability of the publication is improved significantly. Several aspects of the publication are tested during the usability test. These aspects include:

- Whether the information is easy to understand
- Completeness
- Technical accuracy
- Consistency
- Retrievability.

Several of these aspects are tested during the publication development cycle, so the usability testing acts as a partner in testing these aspects.

Technical reviewers, the product designers, and developers focus on the completeness and technical accuracy of the publication. The editor is usually concerned with consistency and the general organization and style of the publication. Because the technical reviewers are often familiar with the publication, they do not have any problem with retrieving information. Likewise, editors do not use the publication in the same way as the customers, so editors do not encounter the same situations as the customers.

It was quite humbling to realize that manuals we are so intimately familiar with, and therefore to us appear easy to use, really cause problems to readers who are looking at them for the first time. Observing the test subjects opened our eyes so that we could look at our publications from a more *objective* perspective.

For the technical writer, another valuable result of usability testing is gaining a sense of accomplishment. The experience of observing the use of our publications in a real-world environment made us realize that all our hard work is not done in vain. We became aware that our manuals are useful to the subjects, and will be useful to the customers, in completing a *realistic* task.

The publications department and the corporation profit from the usability test also. Because the usability test was conducted early in the development of a publication, we had time to plan solutions and solve any problems that surfaced as a result of the test. Observing the test subjects' reactions to the publication aided us in anticipating any problems the customer may encounter. Because we were able to solve these problems *before* the publication was available to the customer, the test saved the department and the corporation time and money. The technical writer's time is used more efficiently -- working on new projects instead of revising poor publications. The corporation's and publication department's costs are cut because of decreased maintenance of published manuals, and the customers are satisfied with their error-free publications.

CONCLUSION

We are professional communicators, and we all know that communication is like a two-way street. As technical writers, we often participate in a communication process that is like a one-way street. We relay information to our readers, but we do not receive any feedback. If you are speaking to some one, how do you know that that person understands what you are saying? The person with whom you are speaking responds. He might nod his head or say something to suggest that he understands. Unfortunately, when you communicate by writing, receiving feedback from your readers is very difficult. Usability testing is one way to add to the communication process between the technical writer and the reader by widening the one-way streets allowing information to pass in both directions. There is always less clutter and confusion when traffic can travel in both directions -- whether on the street or in communication!

Testing Task-Oriented Publications in a Laboratory Environment

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ABSTRACT

In recent years, producers of technical information have placed considerable emphasis on both developing task-oriented information, and testing the usability of that information in a laboratory environment.

Technical information that is well-written and task-oriented, whether printed on paper or displayed on a video screen, allows the user to perform a task by following a unique set of instructions. All superfluous information is eliminated; only the information needed to perform the task is provided.

My first step, when I was assigned the task of testing task-oriented information, was to find out how to do my job. Surprisingly, what I found was a lot of published information dealing with the psychological and statistical theories of testing information but nothing that would assist me in setting up and conducting an information test procedure. Fortunately, I was able to interview people involved in human factors testing and from them obtain enough information to get started.

Testing task-oriented information in a laboratory environment requires you, the test administrator, to wear many hats. Not only must you write the test exercises and conduct the test, but you must also perform a number of administrative, legal, statistical, and personnel duties.

This paper is about all of those hats you must wear. It describes the people, the procedures, the test lab, the results, and some of the forms that you will need. It also includes some advice disguised as fact. More importantly, I hope it will provide a starting point for developing your own test procedure.

TESTING PUBLICATIONS

Testing draft copies of task-oriented publications in a laboratory environment allows the simulation of actual operating conditions by (1) using test subjects with educational and work backgrounds similar to those of the end user, (2) placing the test subjects in situations like those encountered by end users, and (3) requiring the test subjects to perform end-user tasks. Publications testing consists of:

- Writing procedures for test subjects and the test administrator
- Preparing laboratory facilities for the test
- Obtaining test subjects
- Testing
- Collecting and analyzing test data
- Using test data to improve the document
- Using the test experience to improve future tests.

This document provides information needed by test administrators to prepare for and conduct publications testing.

THE TEST ADMINISTRATOR

As a test administrator you are directly responsible for conducting publications testing. You should have the ability to:

- Grasp technical concepts quickly.
- Select a representative sample of procedures to test. That is, you should be able to identify a selection of procedures in a document that is representative of both writing quality and task difficulty.
- Organize a smooth-running test procedure.
- Select test subjects that are representative of end users.
- Display confidence and trust to the test subjects.
- Display an approach to the test that is serious but not stuffy.
- Put the test subject at ease.
- Select test assistants with the same characteristics.

PLANNING FOR THE TEST

The planning phase of testing includes writing the exercises and procedures used during the test and selecting the people that will be involved in the test. Planning also includes scheduling and preparing the test laboratory as described later in this paper.

Writing Test Exercises

Write task-oriented test exercises that answer the following end-user questions:

- Can I *locate* information about the task I want to perform?
  - Does my mental concept of what the procedure title should be match the actual title of the procedure? (Titles can be as diverse as a table of contents entry and an index entry.)
- Can I *perform* the task after I locate the information?
  - In a reasonable amount of time?
  - In a reduced amount of time for successive operations?

Write two sets of task-oriented test exercises:

- The first set of tests (Locate Exercises) check the subject's ability to locate each task in the document after reading or hearing a description of the task.
- The second set of tests (Perform Exercises) check the subject's ability to perform each task once the information is found.

It is not necessary that the *locate* and *perform* exercises be tested consecutively. For example, the *locate* exercises can be tested one day, and the *perform* exercises can be tested the next day.

Each test exercise should contain two headings: "Your Situation," and "Your Task."

Your Situation: A scenario that describes the test subject's need to perform a task.

Your Task: A description of what the test administrator expects the test subject to do.

Design each test exercise in a way that allows you to control the starting of the exercise and insures that you know when the test subject completes the exercise. Before you begin writing test exercises:

- Understand the document that is being tested.
- Select the procedures you will test. Because of time constraints, you will rarely be able to test all task-oriented procedures in a document. Instead, the number of tasks tested and their selection usually depend on:
  - The number of tasks described in the document
  - The critical nature of the task
  - The apparent difficulty of the task
  - The frequency of the task's use.
- Locate possible problem areas (unclear or confusing tasks, for example):
  - Be prepared to handle promptly those problems if they occur during the test.
  - If a task seems to be sufficiently frustrating, be prepared to provide help before the subject's frustration begins to affect the remainder of the test.
- Be prepared to recognize and record unexpected problems during the test.

Writing Test Administrator's Procedures

As the test administrator, you must have detailed procedures to follow during the test. Otherwise, some test events may occur too quickly for you to follow. Write your procedures in numbered steps that are easy to follow. Let each numbered step describe what you and the test subject will be doing at a particular time during the task. Write one step on a page. Then, place the pages in a loose-leaf notebook so you can alter or rearrange steps before testing begins.

Writing Post-Test Interview Questions

Prepare a group of questions to ask each test subject during the post-test interview. These questions should be based on the test document's strengths and weaknesses, as perceived by the writer and the test administrator.

Selecting Test Subjects

Test subjects may either be employees of your company or temporary workers brought in for the test. However, they should have educational and work backgrounds similar to those of the end user of the product you are testing. If you use an outside source to select test subjects, make sure you provide explicit requirements for those subjects. For example, a high school graduate who has worked in a warehouse may appear to be an acceptable subject. But, if he also uses a home computer, he may not be acceptable.

Number of Test Subjects Used: Within reason, the accuracy of testing increases when you increase the number of test subjects. However, adequate test results can be obtained by using five to seven test subjects for each document tested. Use five subjects if the test is short (under an hour); use seven subjects if the test is longer than an hour.

Selecting Test Administrator Assistants

Test administrator assistants must (1) have the same characteristics as those of the test administrator and (2) be willing to work in the background. They should stay out of sight of the test subjects unless otherwise requested by the administrator.

Use the assistants for such things as:

- Making sure the test subjects are in the test lab when needed
- Assisting in setting up the lab for the tests
- Accumulating data during the test
- Timing subjects during the test
- Operating video and sound equipment during the test
- Observing and conducting any other test procedures requested by the test administrator.

Performing a Dry Run

Try out the test exercises, the test administrator's procedures, and the post-test interview questions by performing a dry run before testing begins. For the test subject, use a fellow worker who is not familiar with the device being tested. Correct any procedural, test assistant, or equipment problems at this time. Do not alter or rearrange the test exercises or post-test interview questions after testing begins; doing so might change the test results.

THE TEST LABORATORY

Many times, publication testing is best performed when the test administrator is in the same room as the test subject – interacting with the test subject when tasks are performed. At other times, it is better to have the test subject and the test administrator isolated from each other. An ideal test laboratory is one that accommodates both needs.

Figure 1 illustrates a typical floor plan for a well-designed test lab:

- A one-way window allows the test administrator, and any assistants and observers, to make in-the-room observations of the test subject.
- Four video cameras mounted on the test room ceiling allow the person monitoring the video equipment to record, or just observe, the desired view:
  - the cameras are strategically mounted to provide full coverage of the room.
  - each camera can be rotated and zoomed in or out by the person monitoring the video equipment.
- The test room is equipped with a speaker and a sensitive ceiling-mounted microphone.
- The control room is large enough to accommodate the test administrator and several assistants and observers.

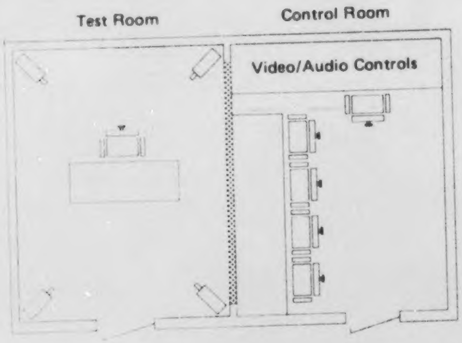

Figure 1. Test Laboratory Floor Plan

Scheduling the Test Laboratory

If your publication testing is conducted in a test laboratory that is shared with other groups, one person will probably be assigned the role of test lab coordinator. Contact the test lab coordinator and schedule the needed lab facilities (test rooms, control room, video cameras, and audio equipment, for example). Schedule the lab as far in advance of the test date as possible. If you will be using the same devices for testing publications that other groups use in their tests (a development model of the product you are testing, for example), make sure the test lab coordinator understands that you will need those devices.

Make sure you schedule enough time for the tests:

- Allow extra time for unscheduled delays during testing.
- Because testing requires a lot of concentration by the test administrator, it can be very tiring. It is better, therefore, to schedule two half-days of testing on succeeding days than attempt to complete eight hours of testing in one day.
- Schedule time for setting up the lab and checking out the test procedures.

Preparing the Test Laboratory

Make sure the test laboratory has been set up and fully checked out before the first test subject arrives. Schedule enough time to:

- Obtain and arrange the required furniture
- Install and arrange the required test devices
- Make sure the video cameras are properly positioned and tested
- Make sure all needed supplies are available (paper, pens, and ash trays, for example)
- Instruct the test assistants in their specific roles
- Perform a dry run of the entire test procedure using a co-worker as the test subject
- Correct any procedural or technical problems.

Scheduling Test Subjects

Work out a procedure to have the test subjects available in the test lab when they are needed.

- This can be a problem because the test lab may not have sufficient waiting-room facilities.
- This can also be a problem that requires a full-time assistant to handle.

CONDUCTING THE TEST

The actual test procedure consists of (1) a pre-test legal procedure if you are video-taping the test or using non-employees as test subjects, (2) a pre-test interview to inform each subject about the test, (3) the test, and (4) a post-test interview to ask further questions and to end the test procedure.

Pre-Test Legal Procedure

It may be necessary for test subjects to sign certain legal documents before they see the information they will be testing or the device they will be using:

- If you are using outside test subjects or temporary workers who were not hired by your company (subjects obtained by temporary employment agencies, for example), it may be necessary for them to sign a non-disclosure agreement – ask your legal department. Usually, a non-disclosure agreement states that the test subject will not disclose any information about the device being tested or its documentation for a fixed period of time. It may also state that your company will not release information about the test subject's performance to his employer.
- If you are video-taping the procedures, it may be necessary for the test subjects to sign a video agreement form. A video agreement form is a statement signed by the test subject allowing your company to use the subject's name, voice, verbal statements and picture for any lawful purpose. Again, ask your legal department. *Note:* Your legal department may also require you to pay outside test subjects a nominal amount of money for agreeing to be taped (to release your company from any further monetary liability for using the video tapes).

Pre-Test Interview

The tone of the pre-test interview should be that of calming the test subjects. Tell them:

- They will be evaluating a document by performing exercises *(do not* say they are taking a test)
- They will not be confined to the room (they can take a break and leave the room at any time – some people encounter various degrees of claustrophobia when confined in a test lab)
- To signal you (by raising their hand, for example) if they cannot complete an exercise
- Each exercise consists of a *situation* and a *task*
- About camera noise (video cameras may be zoomed in or out or repositioned during exercises)
- About the devices (terminals, for example) and documents in the test room that they will be using
- When to begin the evaluation procedure – they should not read or begin the procedure until they are told to do so.

Do not tell the test subjects:

- How many exercises are included in the evaluation procedure
- How long the exercises should take.

The Test

The test procedure is conducted by having the test subject perform a set of exercises. The subject is measured for the ability to (1) locate information and (2) perform tasks by using that information. During the test the test administrator:

- May either be in the test lab with the test subject, or in the control room, depending on the nature of the test
- May not provide any information to one subject that is not provided to all subjects
- May not change the test procedures after the test begins.

Monitoring the Test: Tests are monitored by the test administrator, the author, and the test administrator assistants. Items recorded during the test are:

- Time to complete each task per test subject (or give up)
- Number of assists for each task per test subject
- Reason for each assist
- Amount of time spent reading each task description
- Amount of time spent performing each task
- Number of times the test subject referred to the index, table of contents, or other reference information
- Any spoken or written comments about the test made by the subject.

Post-Test Interview

Use the post-test interview to obtain specific and general comments about the document and to end the session. When the test subject completes the exercises:

1. Go into the room with the test subject.
    a. Ask, "How do you feel?" (This should elicit a response about the exercises or at least relax the subject.)
    b. Ask for general comments about the exercises. Find out what the subject liked or disliked or found simple or confusing about the exercises. Record the comments.
    c. Ask questions about specific problem areas encountered by the subject during the test procedure.
    d. Ask the pre-written post-test interview questions.
    e. Ask if they have anything else to say.
2. Make sure you have all the answers you need from each subject before you end the interview.
3. If applicable remind the test subject of the confidential nature of the information they have been working with and the devices they have been using. Ask them not to reveal to anyone what they have done. If you are using fellow employees as test subjects, tell them it is especially important that they not reveal any information about the exercises to their co-workers – they too may be asked to evaluate the same document.
4. Thank them and end the session.

POST-TEST REVIEW

Immediately after the entire test procedure has been completed, meet with your test assistants. Identify and document those things that hindered the test procedure, improved the test procedure, or might improve future test procedures. Subjects covered should include:

- Mistakes
- Test facility problems
- New ideas that worked
- Ideas for future testing.

Preparing Test Results

Test subject data collected during the test procedure includes answers to specific questions, information volunteered by the subjects, the test administrator's perceptions of the subject's performance, and statistics gathered during the test.

Accumulate in a listing the items recorded during the test, the information gathered during the post-test interview, and the test administrator's perceptions of the subject's performance.

Accumulate in tables the statistics gathered during the test. Use the table information to plot graphs if desired. Correlate:

- Time to complete (or give up)
- Number of attempts for each exercise
- Number of assists for each exercise
- Whether the exercise was completed.

Using Test Results

Test results are used by the following groups:

- *Writers* to find strengths and weaknesses in the document and to correct the weaknesses.
- *Test administrators* to determine the quality of the document and as a tool to measure future drafts.
- *Product designers* to determine if the information is adequately described, and if any information usage problems are caused by hardware or software design.

Need to Know: The Way to Go—Experiences in Task Analysis

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In this workshop participants find out that even though instructions are below a user's reading level and education level, if these instructions are not task-oriented, results are "unpredictable."

Workshop participants try to complete a common task using different instructions. They criticize the instructions given them and, based on their experience, suggest instructions better suited to the task and the audience.

Purposes:

- Give technical communicators a lively opportunity to
  1. Work in a small group on a task involving documentation, and then
  2. Evaluate and suggest improvements to that documentation.
- Learn what a "task" is and how a "job" is broken into tasks.
- Define and analyze the audience explicitly by being the audience and trying to do that audience's task.
- Develop empathy for those using our documentation through experiences with that documentation in a task setting.

EXPERIENCES IN TASK ANALYSIS complements two other conference presentations:

- *The poster session NEED TO KNOW: THE WAY TO GO—Mixed-Media Triptych on Task Analysis*
- *The panel presentations NEED TO KNOW: THE WAY TO GO—Studies in Task Analysis*

First Hour

Participation will be limited to 30. Participants will be divided into groups of 4 or 5. Each group will be given an identical set of small, plastic, interlocking bricks and other "specialty" pieces, such as wheels, designed for children at least five years old.

Each group will try to build the same object using a different set of instructions.

Second Hour

During the second hour, each group will show the finished object to the whole group and make a brief presentation of its experiences—how they proceeded with the task, how they solved problems, the strengths and weaknesses of the instructions, and how they would change the instructions.

This second hour always proves to be a lively exchange of ideas.

See you there!

Online Documentation: Methods and Ideas for Effective Online Interface

Larry E. Struck, Moderator

Speakers
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Summary

Computer documentation has become a frontier for technical communications. In the past several years, technological advances and new applications have reshaped user experience. Information organization problems encountered along the way have produced innovative solutions and new directions in thinking.

Online documentation systems are now capable of, and often require, more sophisticated configurations to provide adequate support. At the same time, there is an overall concern for simplicity in system design and operation which reflects the interests of a rapidly expanding, non-programmer audience. Some relevant questions are: How well can the requirements of increasingly complex programs be matched with documentation that demands clarity and ease of use? Are existing strategies appropriate for an evolving communications environment or should entirely new models be constructed? To what extent will changing tools and methods affect the working lives of technical communicators?

Members of this panel discuss these and other issues as well as invite speculation regarding new developments in the field. In a wider context, STC members may want to consider the significance of more fully automated documentation systems in relation to their future professional roles.

Documentation Systems: Changing Products, Tools, and Theory

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On-line documentation systems are implements of communication and therefore of rhetoric. More than mere electronic parallels to current methods, these systems constitute a new medium. The new tool changes the task. I discuss trends in the products, tools, and theories of technical communication.

In any phase of the documentation process—planning, preparation, storage, distribution, testing, use, etc.—we may use computer tools. Even now, when most of us still publish on paper, computers help us write, create graphics, set type, and watch budgets. More recently, some companies have begun to move completely away from paper, to the so-called "paperless office." Their eventual goal is to convert all documentation activities to the computer, including the distribution and end use of documentation.

What would such a comprehensive system be like? What could we do with it? We could:

- Create new information and revise existing information.
- Store information (whole documents or parts), perhaps in several versions, and get it back out again.
- Deliver information to users or customers. We might deliver information to the user electronically, or convert it to paper somewhere along the way.
- Announce new information.
- Create and route messages (orders, bills, feedback) among producers and users of documentation.

These are different parts of the process of technical communication, things we all do now. Many other people have discussed the practical benefits of doing them on the computer (Figure 1), including speed and flexibility. It's fairly apparent that our field will be very different, that these powerful new tools will open entirely new avenues of communication.

I believe these technological marvels will not merely give us more ready access to information, but by doing so, will gradually change the way we think about information. I believe also that the way we think of the work of preparing that information will change in the bargain. In this paper I'll discuss these trends and show how they are, in a sense, accelerations of older, more subtle trends.

Users may have problems:	Here's how the system can help:
Information scattered throughout many documents. Related information not cross-referenced. Hard to figure out which document is needed. Information not organized by job.	Assembles parts from separate documents ("electronic frankenstein").
Information lags behind introduction of equipment or system. Once ordered, documents take too long to arrive. Ordering documents is difficult.	Helps speed preparation and production; distribution at electronic speed.
No effective filing system. Variety of numbering systems is confusing. Hard to distinguish obsolete from current information.	Sorts and stores automatically; user can retrieve even if he or she doesn't know filing and numbering schemes. Stores all versions; user can get latest, compare with earlier versions.
Too little information on applications, too much technical jargon, impractical examples, source of information not indicated, incomplete information, inaccurate information.	No direct help; by simplifying preparation, may allow us to devote more resources to content problems.

Figure 1. *Common documentation problems may be alleviated by computer technology.*

OUR CHANGING PRODUCTS

Many alert people already have said that using computers will change the products of our work. For example, most computer terminals can display only one color and one typeface, so our use of typography and graphics may become restricted. But more profound changes will also occur. I'll discuss the way documentation systems will change the way we think about information, then link that change with another idea about writing.

Preparing Information, not Documents

We are accustomed to writing *documents*. They begin and end. We develop ideas in some sensible way. We arrange those ideas, subordinate some to others, and bind them in a volume. In so doing, we impose our structure on our readers.

Writing a document for on-line delivery is like writing it on 3×5 cards. A screenful of text on most computer terminals is about what you could handwrite on an index card. Instead of giving our readers a bound document, we give them a stack of "cards." Each card has to convey a unified theme. Now we can no longer control the logical arrangement of the information. Our readers will rearrange the cards in the order they like best, at any time, for any purpose. We can impose no single logical sequence or subordination of ideas; our readers will impose any arrangement they want. This is unsuitable for sequential material like procedures or tutorials. However, it is excellent for reference information wherein arrangement is not trivial, but best left to the reader's preference.

This flexibility promises enormous practical advantages for our readers. For example, instead of flipping through a cumbersome reference manual, they can tell a documentation system what they want, and it will do the hunting for them. But all this presupposes that the reader accepts the information as true or useful, not wondering about who wrote it or where it comes from. (Many documentation systems enable users to read only selected bits of information; thus they may well not know whence it comes.) In a sense, the information is anonymous. The only rhetorical force behind the information is that it comes from the computer. I believe that this way of seeing information, not as a communication from someone but as facts pulled out of a hat, is misleading. But it is not altogether new, as we shall see.

"Writing" or "Generating Text"?

Schreiber[1] describes the effect of structuralism on our view of writing. We think of writers not as communicating through the written word but as producers of written material that becomes the property of readers, who do not interpret, but merely consume (Kurzweil[2]). As Schreiber says,

> *"...texts don't really belong to their writers anyway; they belong to their readers.... Just as a pair of jeans belongs to the wearer (despite the label), so a text belongs to its reader rather than its writer (despite the byline)."*

"User-oriented documentation" and "reader-based prose" are popular themes in technical writing courses. Underlying both is a structuralist notion about writing: If the "text" is "generated" for "consumption" by a reader who will, as Lévi-Strauss said, "own" it, then that "consumer" alone should be served. Now there's nothing wrong with writing *to* your audience, adopting a style and organization best for them. With that I have no qualm. But in emphasizing the reader, I think we sometimes have a skewed view of the rest of the communication process. We come to think of what people write as "text" or "information," a commodity rather than finished goods. We speak of the "transfer" of information and technology as if these things had a life of their own, independent of the people who know and create them.

Students of communication within organizations have long told us that information is a tool. Those who have it wield power over those who don't. Again, we are to view information not as communication but as commodity. But all information comes from somewhere, from someone. The impersonal view of information shifts the source of its rhetorical force from a person to a institution, if it does not dispel that force altogether.

Schreiber's essay suggests the alienation that accompanies this view, both of writer and reader from their work[1], from each other[3] and from themselves[4]. This is an alienation of labor in the most classical sense. Such alienation is not merely a consequence of using the computer, but the outcome of an older school of thought. The poverty of a structuralist view of communication is magnified when our systems deliver anonymous information.

OUR CHANGING TOOLS

So far I've talked about how the *use* of documentation systems may change our view of information. But their *design* affects us as well. I believe technical communicators should be aware of the issues in the design of their own tools, but that is the stuff of another paper. For now, let's consider how the design of the tool may affect the task.

Tool as Agent: The System as a Third Party

On-line documentation systems are a third, intermediary voice in the conversation between writer and reader.

The computer behaves as it is told to by a designer.[2] The computer cannot by itself decide how to behave[5], but unlike a book or a videotape, it does behave as the designer tells it to through instructions or programs. Therefore it is more a rhetorical influence. Books and television are more than mere channels; but of themselves they do not exhibit programmed behaviors. These behaviors give the system a "voice" in the communication between writer and reader. The choices that the designer makes have rhetorical import (Figure 2).

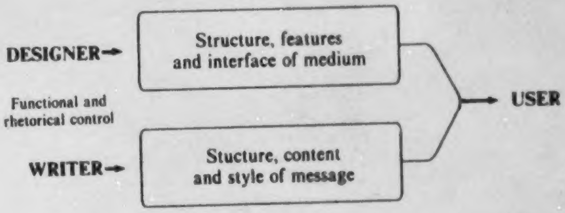
DESIGNER
Structure, features and interface of medium
Functional and rhetorical control
WRITER
Stucture, content and style of message
USER

Figure 2. *A model for the role of the computer's programmed behavior. The writer has rhetorical control over the message and the designer has control, also rhetorical, of the medium. McLuhan argued that message and medium are interwoven; thus the writer's and designer's rhetorical choices may be in synergism or conflict.*

What kinds of influences are we talking about? I want to emphasize that these influences may be for better as well as worse. Some are simple and their rhetorical implications obvious; the more pervasive are more subtle.

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1. In *Myth and Meaning* (Schocken Books, 1979), Lévi-Strauss says "... I don't have the feeling that I write my books. I have the feeling that my books get written through me and that *once they have got across me I feel empty and nothing is left.*" (Emphasis mine.)

2. In "designer" I include analyst, programmer, human factors specialist, etc. In this discussion I do not intend to disparage the work or motives of those who design documentation systems. These people work hard to ensure that their systems are easy to use, flexible, and useful. Inevitably, using the computer empowers us to do things we wouldn't have done before and sometimes makes it difficult to do things that we once did. Designers are forced to make assumptions and choices to meet practical goals. It is those choices that have import for users that is practical, economic, aesthetic, and rhetorical.

For example, one on-line documentation system[6] stores information in chunks whose boundaries may be set by the author. To each of these chunks, labeling codes may be assigned that describe the information within. These labels characterize the *type* of information rather than its *topic*. For example, a cookbook contains distinct types of information (procedures and lists of ingredients) and for many topics (e.g., blueberry muffins). Users can request a particular type of information by asking for all chunks to which the corresponding label has been applied.

None of this is self-evident. That the system uses such labels and stores information chunk-by-chunk instead of some other way is the outcome of choices by its designers. I'm not saying it's a poor choice (in fact, it's one of the best available), but it *is* a choice.

Breaking their writing into chunks and assigning such labels is a new experience for most authors. Some authors benefit because the act forces them to reflect on both the content and structure of their work. However, because the set of labels available is finite, it enforces a taxonomy. And because readers may retrieve chunks in any sequence, chunks should be self-contained. This modularity imposes some stylistic limits that are not imposed on writers of paper documents. In this way, the constraints and powers of the system may influence not only style, but rhetorical strategy as well.

OUR CHANGING PROFESSION

I've said that the tools and products of our work are changing. These changes may seem superficial, in a way; though they have enormous practical impact, do we really have to consider our profession shaken to its roots? Is the essence of our profession really so profoundly affected? To answer such questions, we have to reflect for a moment on some of the ideas on which our profession in based.

My answer, perhaps disturbing, is "Yes." But the changes arise not only from the use of computers and documentation systems, but from other problems they amplify. I shall discuss two.

Our Changing View of Work

I wish to bring to your attention the work of Philip Kraft[7]. In the middle 1970's he studied the work of computer programmers. Others had observed that jobs in many industries were experiencing "de-skilling," that is,

> *"...a deliberate effort to transform work made up of separate but interdependent tasks into a larger number of simpler, routine, and unrelated tasks. Such routinized subtasks can then be parcelled out to workers who do only one, or at most a few, of them over and over, and nothing else. Such workers, obviously, need less skill than the workers who performed all the tasks of the more complex original work....*
>
> *The de-skilling process has been accelerated with the wide-spread application of electronic data processing...."*

For instance, Kraft cited the division of programming work into three levels (systems analysis, programming, coding) as a common way of breaking it into smaller, more routine tasks. He and others attribute this process to managers' desire to reduce labor costs. Braverman[8] suggests that it reached legitimacy with the work of Frederick Taylor and his concept of scientific management. Kraft's intriguing discovery was that the process of de-skilling was happening to programmers themselves. As Kraft says, those whose work often leads to the de-skilling of others' jobs find it happening to their own.

How is the computer supposed to aid de-skilling? First, the move to mechanization gives managers a chance to redesign jobs that are changing anyway. (The deliberate redesign may be hidden by other changes.) Second, when a company is considering buying a computer system, they usually employ experts to analyze both their operations and what they require in a system. Systems analysis and task analysis share an overt tendency to atomize everything. The resulting view of work is like looking through a telescope; you can see any part well but the overall picture is lost. Finally, "expert systems" software may subtly change our idea of expertise. If a program can do 75 percent of what a person can do, we may, for economic reasons, use the program anyway. We cannot help but begin to think of the work at that 75 percent level. If we can't make the tool live up to the task, we may rethink the task to fit the tool.

The Rationale Behind Our Work

I've discussed changes in the way we think of information and the work of preparing it. Now about the reason why we prepare it, I'll say that our reasoning has been in trouble for some time, and that using computers may reinforce some old myths and bum reasoning.

I recommend an essay by Carolyn Miller[9] on the lingering effects of logical positivism on the rhetorical underpinnings of scientific and technical writing. Ms. Miller thinks they have been weakened by remaining traces of a once popular philosophy of science called Logical Positivism.

> *"In this [positivist] view, human knowledge, of which we may take science to be a model, is a matter of getting closer to the material things of reality and farther away from the confusing and untrustworthy imperfections of words and minds. Technical and scientific rhetoric becomes the skill of subduing language so that it most accurately and directly transmits reality. It aims at being an efficient way of coercing minds to submit to reality.*
>
> *"In this epistemology, language, based as it is in personal psychology, is largely a distraction for science; and rhetoric is just irrelevant, because conclusions follow necessarily from the data of observation and the procedure of logic..."*

This way of thinking about science is now largely abandoned by thoughtful philosophers and scientists. Miller discusses a consensual view of science that is emerging in its place and urges a renewed interest in rhetoric. Her view squares with those of Halloran[10] and Langer[11]. In this view, says Miller,

> *"...whatever we know of reality is created by individual action and by communal assent. Reality cannot be separated from our knowledge of it; knowledge cannot be separated from the knower; the knower cannot be separated from a community.*
>
> *"If we pretend for a minute that technical writing is objective, we have passed off a particular ideology as privileged truth."*

Thus science is seen as a communal, intrinsically rhetorical activity. The communication among scientists is fundamental, not ancillary. Objectivity in research or writing about *science* is a myth; to feign objectivity in writing about *technology* is not merely to mistake but to deceive.

One example of positivism's power to distort is the "windowpane" theory of language. Positivism holds that reality can be known only by observation; consequently, the windowpane theory conceives of language as a channel which should convey true observations as unpolluted as possible. Gusfield[12] explains:

> *"The aim of presenting ideas and data is to enable the audience to see the external world as it is...language and style which will approximate, as closely as possible, a pane of clear glass...the author must not intrude into the product."*

Gusfield's example of the folly of a positivist view is that we teach new technical writers to prefer the active voice; yet to leave the "objective" truth untainted by the hovering presence of the author, they must use the passive voice. Under the communal, consensual view of science, authors are permitted to express views as their own; the scientific community can better reach consensus if its members emerge.

SUMMARY

I have discussed ways in which on-line documentation systems pose new problems for technical communicators. And I have discussed philosophical problems. These have been with us awhile. I bring them to your attention now because I believe that using on-line documentation systems may silently accelerate their effects. Our positivist legacy weakens and confuses technical writing as a discipline. Expelling rhetoric from education, theory, and practice perpetuates a mistaken view of science and reduces the humanistic value of what we do.

All these forces combine, I believe, to threaten the vitality of technical communication as a discipline and the morale of its participants. Easy access and manipulation of atomized information may change our view of our products from finished goods to commodity; but this structuralist view is not new. Writers no longer communicate, no longer express, but merely transport colorless facts. Anonymous, unstructured information delivered by a system with its own rhetorical behavior may weaken the rhetorical force of technical writing already burdened by lingering positivism. Finally, Philip Kraft's notion of "de-skilling" may happen to writers. Writers who think their work an art, safe from de-skilling, should realize that all managers and technologists may not agree, either in principle or in practice.

When the skill, humanistic value, theoretical richness, and artful invention are bled from this work and replaced by alienation, intellectual desolation, and procedure, the process will be complete. But the computer and documentation programs will not be at fault. It is a tool and, like any tool, it can be used to benefit or harm. The responsibility lies with us; we should consider and decide what will happen, not wait passively, letting the technology lead the way.

FUTURE DIRECTIONS

Effective communication has been, for several years, a hot topic in management circles. Some learned students of communication have argued that too much has been pinned on it, that many problems in business do not arise merely from poor communication but from deeper causes. For example, "listening skills" were all the rage five years ago. Everybody assumed people weren't *able* to listen; probably they didn't want to listen, but no one thought to ask why. Likewise, though documentation systems promise more *efficient* communication, they do not at all promise *better* communication and will not solve deeper problems.

I have said that documentation systems affect the work and the result of technical writing. They pose new problems and expand old ones. Technical communicators can do several things to prepare for and shape the "brave new workplace." First, we all should be verse in the design issues of documentation systems. Second, we should reconsider our views of what we do and be sensitive to shifts both obvious and subtle. Finally, most thoughtful scientists have abandoned logical positivism; we should do likewise, and rethink the role of rhetoric in our sometimes dry work. We will be better prepared for forthcoming changes in our field if we can clean house beforehand.

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Online Information: A Practical Approach

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This paper describes one practical approach to developing online information, information that appears on computer display screens during use. Based on their experiences in writing a series of Help panels for a new IBM product and an online tutorial for the new IBM 3270 Personal Computer, this approach uses a series of questions. The belief is that by asking the right questions, writers are more likely to produce good online information. The authors describe how the different questions were answered in their specific projects.

Most of us are familiar with the technical writer's struggle to master the blank page by filling it with pertinent printed information. Fewer of us, however, are familiar with the struggle to overcome the *blank display screen* by filling it with pertinent *online information.* Not until a writer is faced with developing online information does the terror of the empty screen become reality. Even as experienced technical writers, we were not prepared for the conceptual differences between the two mediums of expressions: the printed page and the display screen. In many instances, writing online information calls for a frame of mind quite different from that for writing print media information.

Our experiences taught us that the key to writing good online information is to ask the right questions from the start. Some of the questions are similar to those you ask when you write for the printed page. But many of them are unique to online information. First, we will describe the online writing projects with which we were involved. Then, we will classify the questions we asked into those involving strategy, technology, panel design, control flow, and production/maintenance. Finally, we will speculate about the impact of new technologies on the emerging discipline of online information development.

Our Online Writing Projects

We are involved with two kinds of online projects: help panels and an online tutorial.

HELP PANELS. The help panels are being written for a still-unannounced product, so that we will have to describe this project in fairly general terms. The help panels support a software tool that experienced programmers will use while coding programs in a high-level programming language. The software tool runs on large, mainframe computers. When a programmer presses the help key while using that software tool, the system displays one of two types of information:

1. Reference information about the software tool and its commands
2. Task guidance, limited to some of the more frequent tasks

The software tool runs as part of an overall software subsystem, so that the help panels had to be consistent with the help panels already in that subsystem. That is, the subsystem already defined many of the rules and capabilities that the help panels should have.

ONLINE TUTORIAL. The second online project with which we were concerned was an online educational package written for the newly-announced IBM 3270 Personal Computer, an intelligent display station with the ability to manage up to seven concurrent logical units: up to four host computer sessions, a personal computer session, and up to two notepad sessions. The tutorial had to address the range of users from those experienced with both the IBM Personal Computer and IBM mainframe computers to complete computing novices. The tutorial--called HELPER--is composed of around 200 "panels," screens full of information. The tutorial offers both informational and interactive panels and simulates the actual functions of the control program for the work station in an environment which shields the user from mistakes.

Types of Questions

As we began writing our online information packages, we asked ourselves several types of questions.

General Strategy Questions

What kind of online information are you writing? Just as there are many different kinds of books, there are many different kinds of online information. In summary, they are:

1. Tutorial information, which is a staged series of lessons that intend to teach the rudiments of the product. At times, tutorial information may be a cross between product lessons, product demonstrations, and marketing flash.

2. Task guidance information, which is an explanation of how to do a specific task with the computer product. For example, typing a short memo, printing a document, and distributing a document electronically are tasks you can do with a word processor.

3. Reference information, which are dictionary-like explanations of specific aspects of the product. The syntax and semantics definition of each command for a software product is an example of such reference information

Our online projects included all three types. Decisions about what kinds of information to include should be made with a clear focus on the users.

What other online information do you have to be compatible with? Do you have to make your online information look like that other online information?: We were careful to make our online packages look pretty much like the existing online information, so that the user would not be so surprised by new formats. For example, the command line of a help panel or tutorial panel should not defeat user expectations. Placement should reaffirm what the user already knows about the product.

How much information do you put online? Another way to ask this is: what product information will be in printed material and what information will be online? Another consideration is the amount of space in the computer for storing the online information. Storage capacity in a large, mainframe computer is greater, but space allocated to online help facilities takes away space which might be devoted to operating code. With personal computers, some of this problem is alleviated, but the storage capacity is much smaller initially. Accessing a database is one way to deal with this issue. Ideally, all information--even tutorial information--should be accessible from any point in a program.

Some duplication of online information in print is permissible, but word-for-word copying should be discouraged. We duplicated information when it was important to have the information readily both online and in print. But there are times when a printed book is preferable. For example, if your system is down or you do not have ready access to a display, you need printed material.

Technology Questions

For a printed book, your printer or publisher will assist with the mechanics of the printed page: how big the page will be, what the page layout will be, how color will be used, the font and type size of the text, how art and graphics will be handled, and so on. For online information, on the other hand, your "printer" is the display screen. Different users may have displays with varying capabilities.

How big is the screen? What size display screen will your users have, and will they all have screens the same size? Can you divide the screen into different areas, that work independently of the other areas? (This is sometimes called a "split screen.") Can you use "windows" that open and close on the screen? If so, does the user control the screen areas or windows, or does the system. All of these technical questions must be addressed if you are to design the most effective and innovative online information which your system allows.

What colors are available? Will the display be able to use color? Which colors? When you cannot be sure of the type of display being used, you can write to the lowest common denominator--usually a monochrome display. Another possibility is to write a presenter program which allows for both monochrome and color input. This is a programming decision, but one requiring a minimum of code.

Are multiple font and type styles available? What types are available? Does the display have one, and only one type style? Or, can you use different type styles on different panels, or on the same panel? If all displays types addressed do not have multiple fonts and type styles, again, the lowest common denominator dictates a single font and type style.

What is the graphics capability? Some displays let you display rather intricate graphics, approaching the images you see in video games at an arcade. Other displays are suited only for text. Some displays even make it easy to make animated graphics: a symbol that dances across the screen, for example. Your ability to show drawings and other pieces of art will be strongly influenced by the graphics capability of the display.

Again, we used only the simple graphics that you can get at a basically text display, since most of our users would be using a text display.

What sounds are available? Many displays have a "beep" that you can use as an audible indicator to the user. Other displays have a variety of different tones, enough to play a short song. Some displays even have a voice synthesizer that will let the computer speak, but the cost of such new technologies often dictates that many users will not have this option.

Panel Design Questions

Is writing an individual panel of online information like writing an individual page of printed information? It is and it is not. The similarities provide a comfortable beginning, but forgetting the differences is a deadly mistake.

Do you select Informational Panels or Interactive Panels?

- *Informational panels* are intended only to be read, similar to pages in a book. The major question about informational panels is how to arrange the text on the screen so that it is easily readable.

- *Interactive panels* are intended to solicit a response from the user. The design of interactive panels will depend on the capabilities of the user's display to interact with information on the screen. Typical devices for interaction include:

  - Typewriter-like keys, that let the user enter words or numbers.

  - Cursor-moving keys, which move the "spot" on the screen that indicates where the next character can be typed. The cursor can be used as a way for the user to "point" at information already on the screen.

  - Special function keys, that do things like erase lines, add lines, go to the next panel, and the like.

  - Mouse/Joystick, which move a cursor or other symbol on the screen.

  - Light pen, a stylus-like device that lets the user point to specific locations on the screen by pressing the light pen to them.

  - Touch-sensitive screen, which lets the user point to items on the display screen by simply touching the screen.

For our projects, we assumed typewriter-like keys, cursor-moving keys, and the special function keys common to IBM 3270-type displays. The main types of interactive panels are described below:

1. *Menu Panels*, where the user selects from a list of items. Questions about menu panels center on how to best show a list of items (1 column, 2 columns, 3 columns?) and what is the easiest way to let the user select from a list (point to the item in the list, type the number of the item, type the entire name of the item?).

2. *Data Entry Panels*, where the user enters data in response to a prompt on the screen. For example, if the screen says ENTER NAME: the user can type the name after that prompt. Questions about data entry panels center around how to arrange the prompts so that the user can easily tell what needs to be typed in, and where to type it.

3. *Combination Panels*, which include characteristics of both other types of panels.

How do you arrange information on the panel? Most screens have fewer lines than a typical printed page (even though the lines themselves may be the same length). A printed page may be able to handle 65 lines of 75 characters each, where a panel of online information may be able to handle 24 lines of 80 characters each. You need to answer these sort of questions for your panels:

- What kinds of margins do you use?
- How long should you make your lines?
- How big should you make paragraphs (how do you "chunk" your information)?

Even though economy of storage dictates that every available space be used, "white space" is even more important on a display screen than on the printed page. Research indicates that users are fatigued by line lengths greater than 2-2.5 alphabets. Panels too filled with information are also impossible to translate. Thus, we tried to chunk information so that it averaged 3 lines per paragraph. We also tried to keep the format of the panels consistent, and we titled each panel. Maintaining a consistent format helps the user and contributes to ease of use.

How do you highlight information? Can you intensify words and phrases? Use color? Use different type styles? Underline? Or is all-capping the only highlighting device available? We used highlighting sparingly. Too much highlighting destroys the effect, and large passages of all-capped material are difficult to read.

What kinds of things should be highlighted? What is the proper balance between highlighted text and normal text on a single panel?

How do you break information across panels? There are times when you simply cannot fit a single topic on a single panel. How do you indicate that there is more information on the next panel?

We used several kinds of devices. An indicator in one of the corners of the panel can say something like: PAGE 2 OF 4. An ellipse can indicate more information is to follow.

Control Flow Questions

A fact of life with online information is that users very easily get lost. (Finding your way around a series of online information panels can be like finding your way through a maze). One of the biggest challenges in writing online information is connecting your panels so that the organization is logical and not likely to let the user get lost.

Do you choose linear, hierarchical, or network organization? The easiest online information structure to think about is the *linear* structure. The panels are organized in a straight line, like a book; you go from the first panel, to the second panel, to the third, and so on. This is a useful structure for a tutorial or any type of online package which follows a strictly defined reading path. The problem here is that the user may want to skip ahead, or flip back without passing through all the intervening panels.

Another common online information structure is the *hierarchy*, also called a "tree-structure." With a hierarchy, the user narrows in on the topic by selecting paths through the hierarchy of panels. The initial panel may give you the choice of topics A, B, C, or D. If you choose B, that panel gives you a description of B with the option of seeing either B1, B2, B3, B4, or B5. You can then select B3 to read, and then get a choice of further topics. The hierarchy then organizes the information in levels; you can read the information at a certain level, go down to the next level, or return to the previous level. Thus you have some limited freedom of what panel you will see next. But without the kinds of "navigation aids" we discussed earlier, there is a danger that the user will feel abandoned in the midst of some grand, implicit flowchart known only to the writer.

One final online information structure is the *mesh network*, where you can get to any panel from any other panel. With this complete freedom of what to see next comes the burden of knowing what to ask for. If the user is unfamiliar with the possible choices, whole areas of the online information may remain unknown.

Often, combinations of these three types are effective. Consistency is still a good rule. Don't teach a user a structure only to violate that structure.

What does the user do to control panel flow? Does the user press a key to page forward or backward--or select from a menu of topics to see next--or enter a command that specifies what panel to see next?

Research suggests that users--especially computer-naive users--are most comfortable with menu-driven online packages. We allowed users to select menu items and to page forward and backward. Offer the user a way to move backward and forward from any panel so that users are not captive by screen images and trapped into a single panel. A "goto" function allowing users to jump to selected panels is also useful and comforting.

How do you keep the user from getting lost? In order to keep from getting lost in online information, you need to know where you have been, where you are now, and where you are going. There are a number of different things you can do:

- Keep the structure of the online information simple
- Develop organizational conventions that are obvious to the user
- Teach the structure of your online information
- Provide an online table of contents and/or index
- Provide an "escape" key that takes the user out of a topic

Production/Maintenance Questions

Who creates the panels and how do they do it? Do you have to be a programmer to create online panels? Do you communicate your intentions to a programmer? Or do you use some standard authoring tool?

For our projects, we created panels basically like this:

1. We designed the panels and the panel flow and described the programming requirements.
2. We gave the panels names (say, Panel AA, AB, AC, etc.).
3. We specified the other panels to which this panel was connected (panel A will go forward to panels A1 or A2, and will come from panel AA).
4. We set colors and defined highlighting.

How easy is it to change the online information? Testing may uncover problems in text or in the flow among your panels. The product may change in the next release. You can spend a great deal of time retyping panels if it is not easy to (1) change the text of a panel, and (2) change the connections between panels.

A final word

Beyond asking the right questions, what else can you do to help yourself produce better online documentation? Our overall recommendation is to fit yourself into the tradition of online documentation that is already developing. You can do this by using as many different kinds of online information as you can lay your hands on, including video games at the arcades. We do not believe that you can write a good piece of online documentation if you have never used any yourself, or if you are ignorant of many of the pieces of online information already on the market.

The rules for writing online information are still emerging. Most that exist have been taken by analogy from the rules for printed material. But, if you are a user of some of the existing online information products, you can tell what is good, and what is bad. You can then build on that experience when writing your own online information.

Online Documentation: Promise and Problems

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ABSTRACT

Continued improvements in computer storage capability offer the possibility of putting documentation in the computer itself. Computer users can access this online documentation directly from a display terminal while they are performing work on the computer. To take advantage of the capabilities of the computer and the television-like display terminals on which the information is viewed, the technical communicator must organize and write the online documentation differently than printed documentation.

INTRODUCTION

In the words of a computer user, "Tell me everything I need to know to get the job done, but don't burden me with a lot of documentation." Sooner or later, each writer of computer documentation has had to face this dilemma.

If the computer user is performing a few simple tasks, it might be possible to write a small manual that tells the user everything he needs to know. But typical computer systems have several levels of users who perform different types of tasks. There must be enough documentation for all users to successfully complete all of their tasks on the computer. Too often the result is a library of manuals containing hundreds, even thousands of pages.

Writers try to organize these manuals by function, type of user, and task to be performed. But many tasks are interrelated. If the information about all interrelated functions and tasks is put in a single manual, the result could be a book so huge that it becomes unwieldy. The user is intimidated by it and avoids using it. If the information is split into separate, more manageable manuals, the user frequently ends up hunting through several manuals for all the information he needs. Even worse, he may not be able to find the right manual when he needs it.

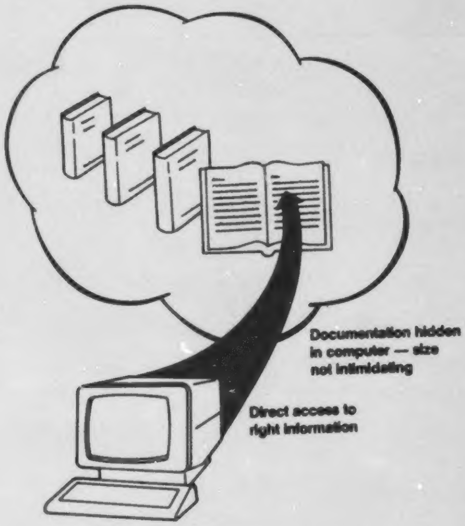
Until recently, there was little choice other than to supply the information in printed manuals. Computer storage was simply too limited and too expensive to be used for documentation. With recent advances in computer storage media, it has become feasible to put online more than just the basic displays and messages needed to communicate with the computer. It has become feasible to include supplementary information that helps people use the computer. Continued advances in current storage media and the development of new storage media, such as videodiscs, offer the possibility of putting virtually all computer documentation online.

WHY ONLINE?

Why put the documentation online? Here is the potential solution to the writer's dilemma cited earlier. All of the information is in one place–in the computer itself–rather than scattered among various publications that may not be immediately available.

With suitable programming support, the writer can link the online documentation to the computer programs in such a way that the user has immediate access to all the information he needs without having to hunt for it. There may be the equivalent of thousands of pages of documentation online, but the user is not intimidated by the volume of information because he sees only the segment he asked for.

ADVANTAGES OF ONLINE DOCUMENTATION


Documentation hidden in computer — size not intimidating
Direct access to right information

DESIGNING ONLINE DOCUMENTATION

In designing online documentation, the writer must keep in mind not only the way a user interacts with the computer through a display terminal but also the capabilities and limitations of the terminal.

The Information Module

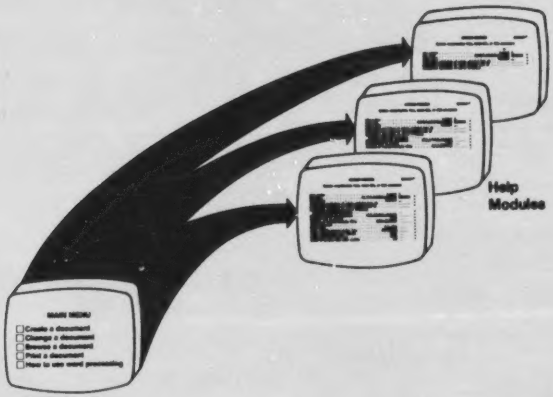
As different computer users perform their respective tasks at a display terminal, they tell the computer what to do by interacting with various units of information that are displayed on the terminal screen. Because of limited knowledge and experience, some users may need extra *help* information to complete their task. Some tasks will be related, which means that a common set of help information may be needed for several tasks. As users become more familiar with the procedure for performing a particular task, they will need less help information. Each user should be able to get as much information as he needs, but he should not be forced to wade through more information than he needs.

These varying needs can be accommodated by organizing the online information into modules that can be accessed separately or in various combinations. The online information module is somewhat analogous to a chapter or section in a book. But the writer should not set his mind too firmly on this analogy. The information that is put in each module should be based on how the module relates to a task or set of tasks that the user will be performing on the computer.

To better understand the nature of online documentation, it is useful to distinguish between two types of information modules:

- *Task modules* through which the user interacts with the computer. Through these task modules and the programming that supports them, the user supplies the information that tells the computer what to do.
- *Help modules* that the user can, at his option, call on for more information about using the computer.

TYPES OF ONLINE MODULES


Help Modules
MAIN MENU
Create a document
Change a document
Browse a document
Print a document
How to use word processing

Task Module

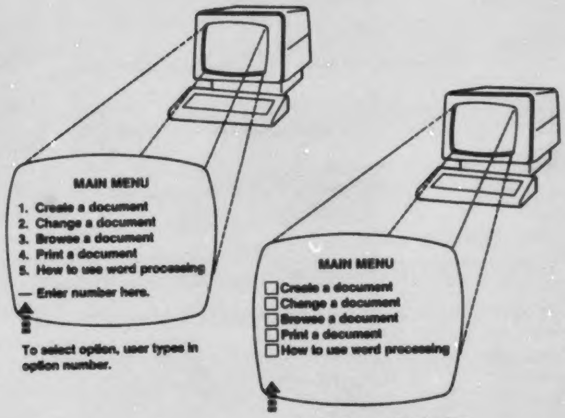
Traditionally, technical communicators have been concerned only with the second type--the help module. Printed computer documentation contains the equivalent of help modules. A good argument could be made that technical communicators, by virtue of their expertise in presenting information, should be designing both task and help modules. Regardless of who designs what, it is crucial that both types of modules be designed concurrently as integrated units.

The designer of the online documentation must determine not only what information to put in each module but also how to interconnect the various modules. The key to proper design is a detailed analysis of what the user will be doing on the computer and what information he will need at each step.

Consider the case of a computer user who wants to perform a word processing task. Suppose the starting point is a word processing menu, which offers several options that the user can choose from. This menu is the initial task module in the online documentation for word processing.

All but one option on the word processing menu leads to another task module. The final option leads to tutorial-type help modules on how to use word processing. These tutorial modules introduce the user to word processing and provide a set of practice exercises.

MENU EXAMPLES

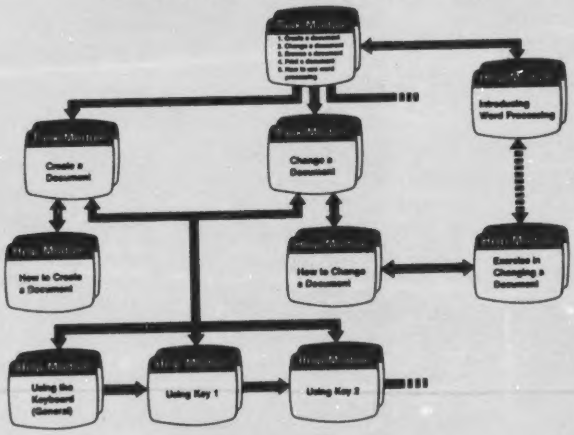

MAIN MENU
1. Create a document
2. Change a document
3. Browse a document
4. Print a document
5. How to use word processing
— Enter number here.
MAIN MENU
☐ Create a document
☐ Change a document
☐ Browse a document
☐ Print a document
☐ How to use word processing

To select option, user types in option number.

To select option, user touches box beside option description.

Now, suppose the user selects the option to change a document. He is presented with a task module that first asks him to identify the document and then displays the text of the document so that he can make changes. Supporting the task module are separate help modules that describe the procedure for changing a document as well as the use of each special key on the keyboard. As needed, the user can go directly to the description of how to use a particular key or to a combined description of all keys. If he is a first-time user, he may want to go to the tutorial module that contains a practice exercise in changing a document.

LINKING THE INFORMATION MODULES


1. Create a document
2. Change a document
3. Browse a document
4. Print a document
5. How to use word processing
Introducing Word Processing
Create a Document
Change a Document
How to Create a Document
How to Change a Document
Exercise in Changing a Document
Using the Keyboard (General)
Using Key 1
Using Key 2

Even in this simple example, we see that there must be multiple paths to particular modules or sets of modules. The modules should be designed as building blocks that can be linked together in various ways with various points of entry and exit. As a general rule, the smaller the individual module, the more versatility the writer has in combining it with other modules.

For those users familiar with and comfortable with the conventional printed reference manuals and guides, the writer could also link all of the help modules together to form the online equivalent of a reference document or encyclopedia. However, these links should be added after, not before, the help modules have been designed and linked to the appropriate task modules.

Note that there is only one copy of each module in the computer. When a user asks for help at a particular point in his work on the computer, he is affecting only the programming links between the modules. The information in each module is unchanged. Yet, it appears to the user that he has his own special copy of the information.

There may be occasions where a computer user wants a printed copy of the online help information. Because almost all computers have at least one printer, the user could be given the option of printing his own copy of all or any set of the online information modules.

The Basic Unit - The Information Frame

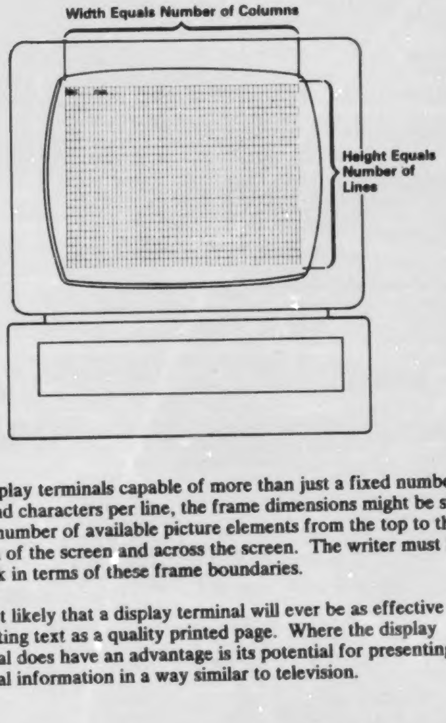
Once the writer has determined what information should go into each module and how the modules are interconnected, the actual writing can begin. Design has always been important in writing. In writing online documentation, the different nature of the display terminal makes design paramount.

A display terminal is more like a television set than a book. The information that is shown on the screen at any given time is like one picture or *frame* in a motion picture film or on a videodisc. The information module, therefore, should be designed as a sequence of frames that will be shown one after another on a display screen.

The capabilities of the display terminal determine the amount of information that fits in each frame and, to a great extent, the way in which the writer presents the information in the frame.

A typical display terminal in use today is capable of reproducing only a fixed number of lines with a fixed number of characters per line. For this type of terminal, the height of the frame is determined by the number of available lines from the top to the bottom of the screen; the width is determined by the number of available character positions (or columns) across the screen.

THE INFORMATION FRAME



For display terminals capable of more than just a fixed number of lines and characters per line, the frame dimensions might be stated as the number of available picture elements from the top to the bottom of the screen and across the screen. The writer must learn to think in terms of these frame boundaries.

It is not likely that a display terminal will ever be as effective in presenting text as a quality printed page. Where the display terminal does have an advantage is its potential for presenting pictorial information in a way similar to television.

Unfortunately, the majority of display terminals in use today are essentially nothing more than typewriters with a display screen. The graphics capability of such terminals is limited to what an inventive writer can create from the characters on a typewriter-like keyboard. At best, the results are primitive compared with the graphics in a printed document or true video. So the writer is faced with the challenge of trying to create documentation for a primarily pictorial medium that is capable of reproducing only text.

Whether the information frame contains primarily text or graphics, the writer should think of the frame as one picture rather than as individual units of text and illustrations. Each frame should have a visual balance, and there should be a visual consistency from one frame to the next. The writer must learn to tailor what he says and the way he says it to make each frame complete in itself. Rambling paragraphs and complex illustrations are out. Judicious use of space to avoid visual claustrophobia is a must.

WHERE ARE WE GOING?

In terms of what it can be, online documentation is barely out of the stone age. The development tools are primitive and terminals that can display more than just text-like characters are still the exception.

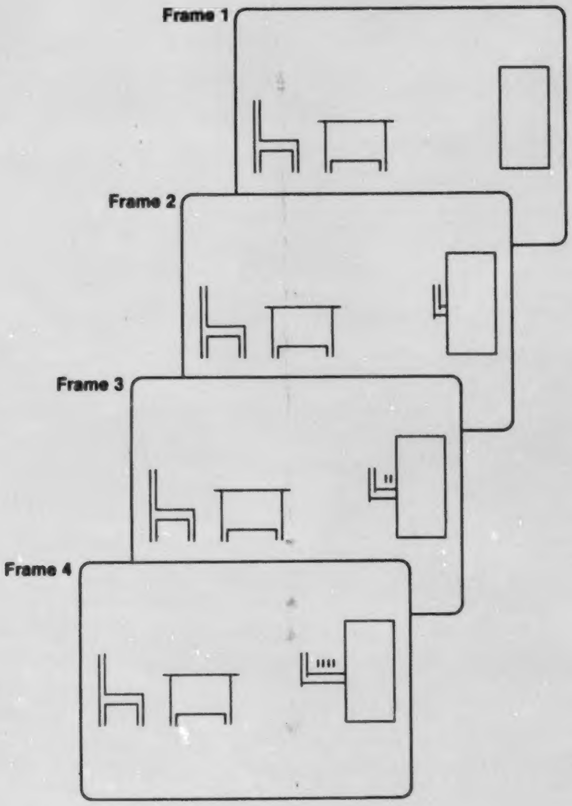
As automated development tools and enhanced display terminals become available, technical communicators will be able to take advantage of the full potential of online documentation. The recent signs are encouraging. Display terminals with both text and graphics capabilities are becoming more common. Pictorial approaches to online information are beginning to appear. Videodiscs that can hold the equivalent of many thousands of pages of information are being introduced. And technical communicators are beginning to get valuable experience in creating online information.

The question, "what should we put online?" will have a different answer a few years from now than it does today. As the cost of storing information on computers comes down and the amount of available storage goes up, storage limitations will no longer be a reason for not putting documentation online. Technical communicators are already finding that online documentation can be presented in ways that are not even possible with printed documentation.

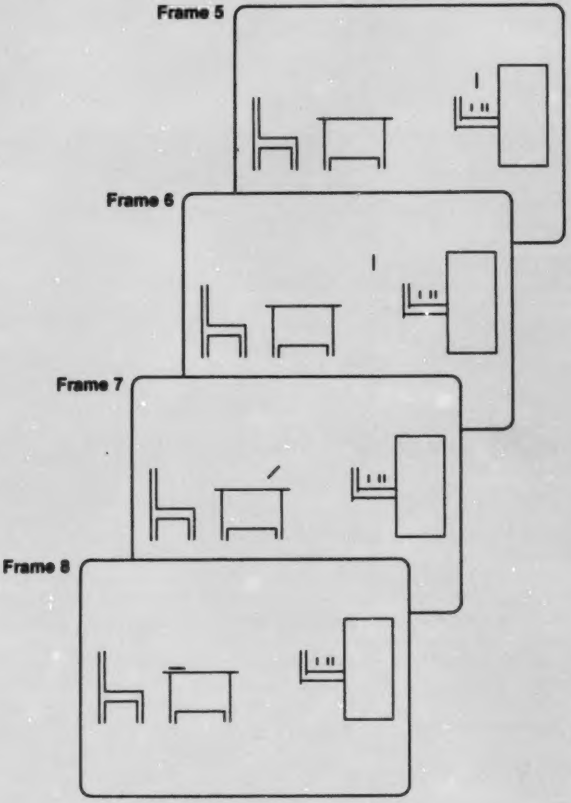
Consider, for example, the value of animation in showing a sequence of operations or actions. Animation, after all, is nothing more than displaying in rapid succession a series of frames of information in which one or more elements have been slightly shifted. Even with the limited capabilities of display terminals in use today, primitive animation can be created by programming the computer to automatically display several frames of information one after another on the terminal screen.

As the amount of computer storage increases, it will become possible to use many rather than a few frames for each animated sequence. The more frames per sequence, the more effective the animation becomes. If an audio capability is added, the result is the online equivalent of an animated video program. Technical communicators might be well advised to learn video and motion picture techniques.

CREATING ANIMATION — I



CREATING ANIMATION — II



The earlier discussion of information modules distinguished between task modules and help modules. The distinction is already becoming hazy and is likely to become more so in the future. If a user asks for a help module and then alters the actions of the computer by supplying information through that module, is it really a help module or a task module? Where possible, the writer should take advantage of the capability for direct interaction between the user and the computer. Why not give the user a do-by-example capability? Provide practice exercises in performing various tasks, but also allow the user to supply real information along the way so that the task is actually performed when the exercise is completed.

It has been said that computers will soon be so easy to use that no help information will be needed. Technical communicators experienced in computer documentation have reason to find this assertion overly optimistic, especially for computers with a variety of users having different levels of experience. Nevertheless, eliminating the need for help information should be the goal. Perhaps the best way to reach that goal is to use the expertise of technical communicators in designing the task information.

CONCLUSION

Online documentation opens new vistas to the technical communicator, but he must learn that online documentation is not the same as printed documentation. To provide the appropriate information for each user performing a task on the computer, the online documentation should be organized in modules that can be linked together in various combinations. Individual modules are composed of one or more information frames. The frame is the set of information presented on the display terminal at one time. Each frame must be designed as a complete unit that takes best advantage of the capabilities and limitations of the display terminal.

Early versions of online documentation may look more like copies of printed documentation than they should. But, as the tools improve and technical communicators gain a better understanding of the nature of online documentation, the full potential of online documentation will begin to be realized.

The Renaissance Age of Electronic Editing

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A radical change in traditional publishing methods is called for to benefit from the electronic text processing equipment now available. One such change is presented in a workshop that allows participants to observe the dynamics of a new publication process firsthand. Previously, editors marked paper with red ink (or blue pencil) and depended on a series of specialists to generate the final product. With the present technology, each editor now can do it all: input and change text electronically, format, typeset, and paste up camera-ready copy. The workshop focuses on the expanding role of the editor (or writer/editor) as computers find wider usage in the publication industry.

BACKGROUND

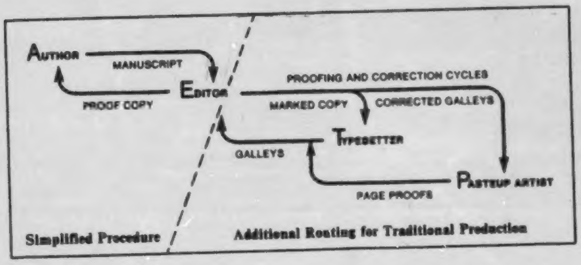
Since the colonial days of publishing, when newspaper editors often wrote, edited, set type, and printed the news, jobs in the publication business have become increasingly specialized. Editing, typesetting, proofing, art, photography, pasteup, and printing—all are now commonly done by different people in separate departments or organizations. The technical complexity and skills required for each of these tasks made this division of labor necessary, and this method became traditional.

With the recent movement toward computerized word processing, many of the tasks that previously required years of training are now being done better and faster with electronic equipment. For example, equations that were once laboriously set by hand, one character at a time, can now be input and phototypeset in place on the page, with much of the spacing and formatting accomplished automatically.

The capability of the new equipment prompted an experiment which has since become the new method for technical publishing at the General Electric Research and Development Center. The experiment was for editors to acquire skills in computerized word processing and pasteup in order to input, edit, lay out, and prepare camera-ready copy single-handedly.

The following chart shows both new and traditional procedures for preparing camera-ready text from the author's manuscript. The arrows indicate the movement of a job from one person or component to the next, and each cycle may be repeated several times before the job goes on to the next operation. In the traditional procedure shown on the right, for example, marked copy is typeset, then sent to the editor for proofing, returned to the typesetter for corrections, and so on. Because traditional production involves various additional people contributing to each job, major time-consuming functions of the editor are coordination and quality control at each step of the process.

The simplified procedure at the left of the chart shows that the number of times a job has to be passed from one person to the other has been dramatically reduced with the new method. As a result, the editor's time can be spent more productively because less time is needed to log jobs in and out, to schedule and track job progress, and to correct errors caused by misunderstanding. Significant improvements in productivity, speed, and accuracy have been demonstrated by editors using this new method.



WORKSHOP

The workshop examines what happens when new skills are acquired and workflow is simplified. Participants form teams and tackle publishing assignments, using both traditional and streamlined techniques, and then compare the results of each.

The workshop consists of three phases:

- Formation of teams and description of activities
- Editing, production, and review of final text using the kits supplied for the workshop
- Interpretation of results in light of participants' own job experiences

Activities start immediately with the formation of teams of four to seven people. Team members share their background experience and interest in electronic text manipulation as kits are distributed.

Then the production game begins. Team members become writers, editors, and production staff. The teams—operating within new or traditional frameworks—produce and review "camera-ready" copy from given texts.

In the next phase of the workshop, participants analyze the game and talk about the changes that are taking place in their own jobs. Finally, the group discusses a few of the changes coming in publication procedures and predicts the career trends that will result from further technological advances.

The advantages demonstrated by this simplified structure for publishing should be of interest to technical writers, editors, and managers of publishing operations who want to enhance job skills and improve productivity.

We are approaching a renaissance era in which a single person, mastering a variety of skills, will be able to undertake the complete editing and production process—a synthesis that has been lacking since colonial days. The benefits of this one-step production process will increase as more advanced skills and electronic equipment are developed.

Adapting Technical Reports for Multiple Audiences

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The means for effective communication of technical information depends upon the audience. It runs the gamut from a technical report directed to a selected scientific group to an article for lay persons with no more than a casual interest in the topic. The papers in this session are devoted to the concept of multiple use of technical reports. Consideration is given to the benefits as well as the problems and methods of adapting material intended for a limited scientific or technologic audience to a broad popular audience. The spectrum of views ranges from those of technical research or engineering writers to trade magazine editor.

One particular viewpoint concerns readability. Readability is the major key to good technical communication, especially when the audience is not educated in the particular technology or scientific discipline. The question then arising is how to gauge the fitness of a given article for its intended audience. The discussion of this question and the general merits of the multi-use concept will present challenges for further contributions from the session audience when the presentations are concluded.

The Multi-Use Concept
A Cost-Effective Way to Present Technical Material in a Number of Forms

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ABSTRACT

The multi-use concept involves reshaping existing technical material for a variety of audiences and applications, including reports, brochures, conference papers, magazine articles, and seminars. Companies typically develop these various forms independently, even when they cover the same subject. The multi-use concept eliminates this duplication of effort by developing new forms from old. This represents a significant cost and time savings, a savings which can be increased if a technical writer, rather than an engineer or scientist, performs the conversion. The concept has several additional benefits: the company can reach wider audiences more efficiently, the technical originators can disseminate their work with little effort, and the technical writers can achieve greater job satisfaction, increase their technical knowledge, and expand their professional repertoire.

THE MULTI-USE CONCEPT

The multi-use concept is an inexpensive and efficient method of reshaping technical material into a variety of forms. Companies speak in many ways--by means of reports, papers, journal and magazine articles, seminars, proposals, and brochures. The same information is often presented in many forms (a form being virtually any method of communication), but typically each form is developed independently of the others. A study group issues a report, an engineer writes a paper, one division presents a seminar, another publishes brochures--all deal with the same subject; all are handled separately. The multi-use concept links these efforts by providing a way to develop these forms as a series. It involves taking material from a base form, which may exist or which may be created for that purpose, and reshaping it into new forms. A report may be developed into a paper, then a seminar, then a brochure (Figure 1). Much of the same material is reused each time, so more forms can be developed for less effort and expense than would be possible using conventional methods.

BENEFITS

The multi-use concept benefits the company, the technical originator, and the technical writer.

The company reaps rewards from the efficiency of the process. Most of the cost of producing a form is spent on its initial development: information must be gathered and organized, text composed, and figures drawn. By building on existing forms, the multi-use approach avoids redoing this groundwork every time a new form is created; developing new forms can become a simple matter of a new slant, a slight reorganization, or a new format. Even if developing the new form requires substantial rewriting, it is still simpler and less expensive than creating the form independently. The company can be heard in a variety of new ways for very little time and money beyond what was required for the base.

Technical originators can become more prolific, disseminating their work and enhancing their professional reputations by reaching audiences they otherwise would not have time to approach. This also increases market exposure, which can bring jobs to their groups. Because most of the work can be done by a technical writer, they can accomplish this with little effort, allowing them to devote themselves to their areas of expertise.

Technical writers can become involved in the development process and learn more about the subjects they are writing about. This knowledge often carries over into other aspects of their jobs, giving them a basis for more substantive input to all their work. Further, they gain experience in producing a number of forms, expanding their repertoires. Thus, the multi-use concept contributes to technical writers' professional development and job satisfaction.

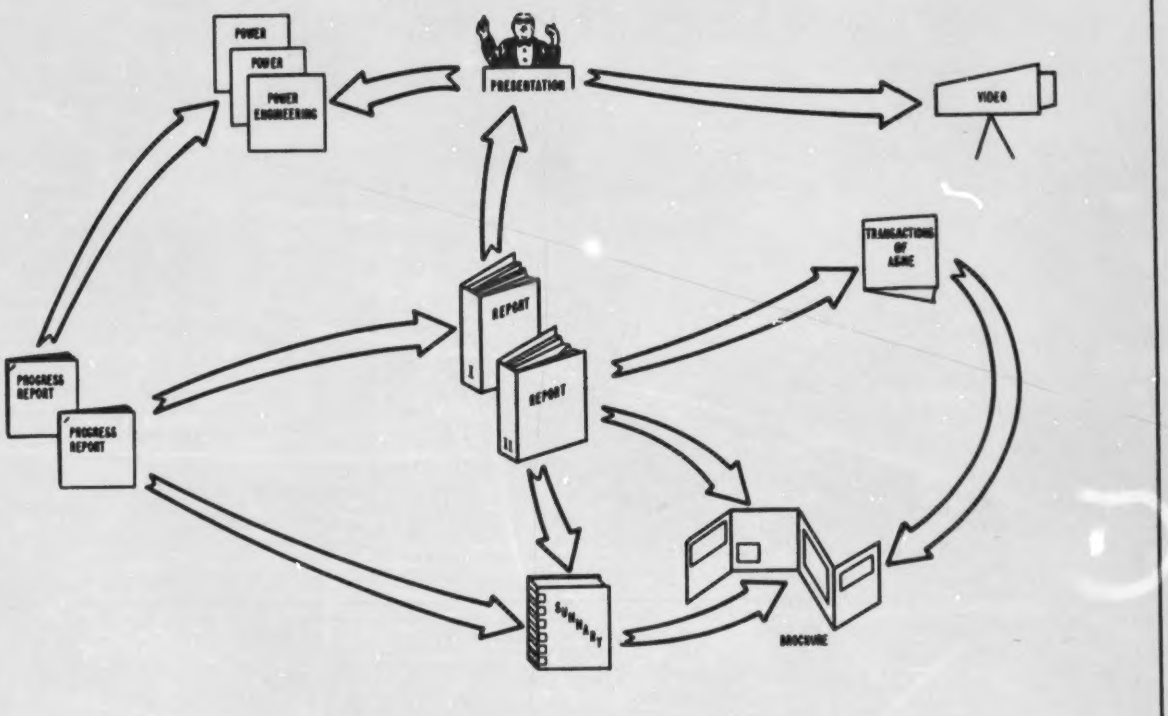

FIGURE 1. A MULTI-USE CHAIN

DESCRIPTION

Multi-use can be used to develop a wide variety of forms. Flexibility and imagination can produce a seemingly endless list of possible conversions, including:

- reports
- conference papers
- articles for journals and magazines ranging from academic journals to trade magazines to the popular press
- brochures
- continuing education seminars
- presentations to clients
- videotapes and films
- educational texts
- poster sessions at trade shows

Some forms provide more appropriate starting points than others. Technical reports contain a large amount of information on which technical writers can draw, allowing them to produce a variety of new forms with minimal effort on the technical originator's part. However, a brochure may not provide enough detail, making it necessary for the writer to seek additional information before a new form can be developed. The starting point might be one document or several; for example, a technical writer could convert a series of reports into an overview report, paper, or article.

A technical writer should be included in the process as early as possible. In this way, he or she will become intimate with the subject so that conversions can be made quickly and efficiently. The "engineer/writer approach" to writing(1) is an effective way to produce any form. According to this approach, the technical originator and the writer work together to produce an outline. The technical originator then provides the necessary information, either orally or in the form of existing reports, papers, journal, articles, etc., and the writer uses these materials to create the form. The technical originator need only meet with the writer to answer questions, solve problems, and finally review the product, leaving the originator more time to devote to other tasks. If the same technical writer makes each conversion, he or she will learn more about the subject with each form, so each subsequent form can be developed more efficiently than the last.

It would be nearly impossible to provide detailed guidelines for developing a series of forms, although such guidelines could be developed for converting one specific form to another. Different forms have different purposes and audiences; these determine the appropriate level of detail, graphics, length, format, vocabulary, and slant. However, certain considerations are worth noting:

- Introductory material usually must be rewritten when one form is converted to another. In some cases, most of the trans-

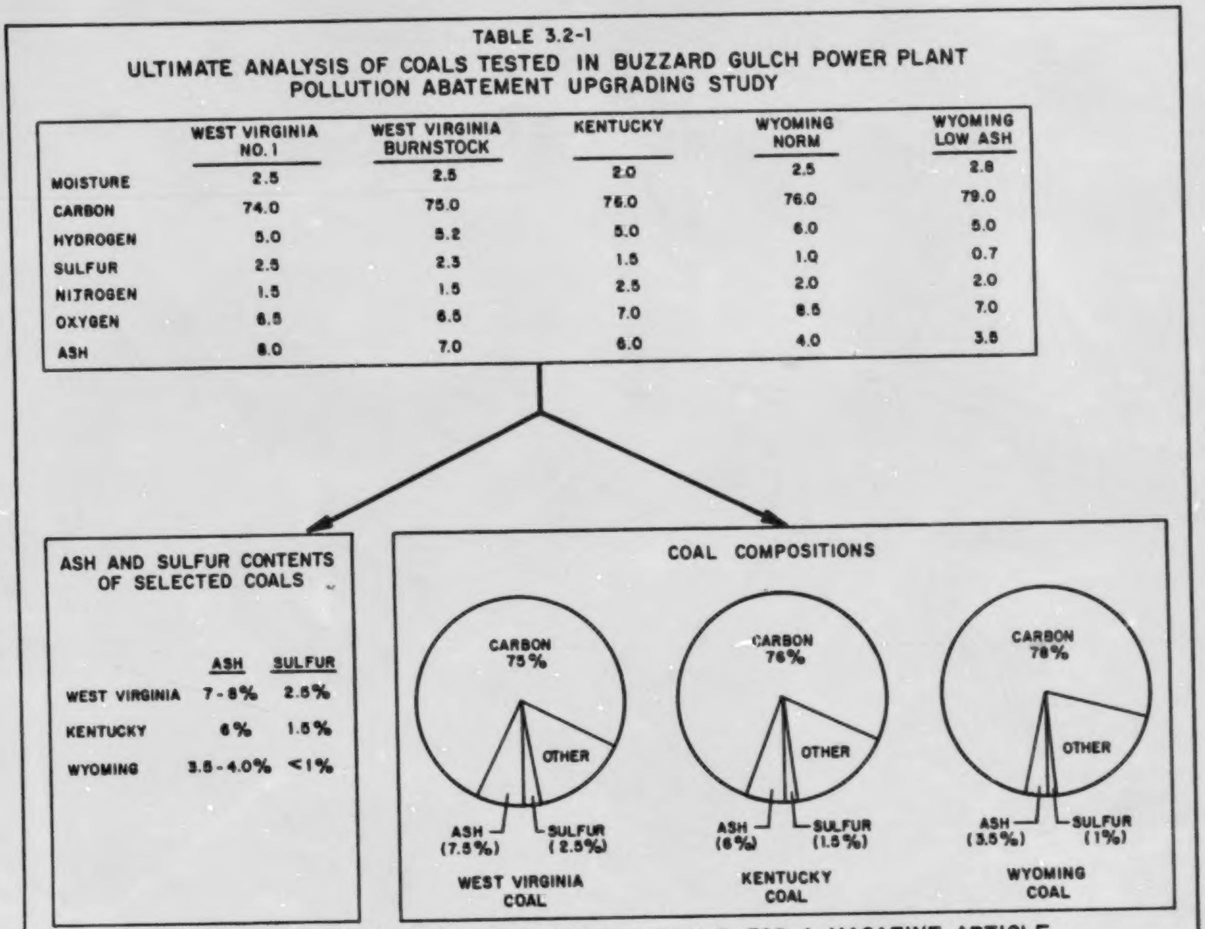

TABLE 3.2-1

ULTIMATE ANALYSIS OF COALS TESTED IN BUZZARD GULCH POWER PLANT POLLUTION ABATEMENT UPGRADING STUDY

	WEST VIRGINIA NO. 1	WEST VIRGINIA BURNSTOCK	KENTUCKY	WYOMING NORM	WYOMING LOW ASH
MOISTURE	2.5	2.5	2.0	2.5	2.8
CARBON	74.0	75.0	76.0	76.0	79.0
HYDROGEN	5.0	5.2	5.0	6.0	5.0
SULFUR	2.5	2.3	1.5	1.0	0.7
NITROGEN	1.5	1.5	2.5	2.0	2.0
OXYGEN	6.5	6.5	7.0	8.5	7.0
ASH	8.0	7.0	6.0	4.0	3.5

ASH AND SULFUR CONTENTS OF SELECTED COALS

	ASH	SULFUR
WEST VIRGINIA	7-8%	2.5%
KENTUCKY	6%	1.5%
WYOMING	3.5-4.0%	<1%

FIGURE 2. SIMPLIFICATION OF A REPORT TABLE FOR A MAGAZINE ARTICLE

formation is accomplished by this rewrite. The article's slant and the way the audience perceives the material is established by the introduction.

Conclusions usually must be rewritten to suit the slant and their location will vary depending on the type of form. For example, the first sentence of a magazine article often presents the major conclusion, while the conclusion of a technical report often appears at or near the end.

- Attracting and maintaining audience interest is more vital to the success of some forms than others. Technical reports and manuals usually have a captive audience that must have the information. Magazine audiences are seldom captive; they must be captured. Their interest must be aroused when they read the title and must be maintained to the last sentence.

- Tables in highly technical forms such as reports and manuals tend to be complex and present detailed technical information and data that cannot be communicated effectively by text. Headings tend to be short and often contain abreviations or terms that are explained only in the text, if at all. Other forms--magazine articles, for example--use tables to summarize or highlight key points, in many cases reitterating material found in the text. Headings are longer, and the tables usually can be understood without reference to the text. Figure 2 shows how a complex report table can be converted to a simple table or figure for use in an article.

- Similarly, highly technical forms use detailed drawings and graphs to communicate information not appropriate to text. Color is used only when necessary to clarify this information. Often, the reader must refer to the text to understand the figure. Magazine and brochure graphics have a much lower level of detail, in keeping with the text. They often make lavish use of color to attract and maintain interest, and are usually intended to supplement and reiterate the text. In some cases, magazine and brochure figure and table captions tell the entire story. In others, text actually supplements the graphics; the pictures tell the story.

AN EXAMPLE

The multi-use concept is best understood by following the development of a series of forms through various stages. For example, a company conducts a major study of a new way to burn coal; the study is sponsored by a group of electric utilities, although the results are applicable to several other industries. Progress reports are generated periodically throughout the study. Based on these progress reports and on other appropriate information (the project description in the proposal, for example), the company produces a report to the sponsoring utilities which includes a summary, an introduction, a description of theory, a description of methods used, results, and conclusions. Although the report is comprehensive, it is aimed at a specific audience and therefore does not define terms or concepts that audience would know. It does not discuss the motivations of the study at length, as the audience presumably knows these also.

Conference papers to technical societies can be based on the report as a whole or on any significant section. The way the report is rewritten depends upon the particular conference. An overview paper, with the conclusions moved to the front, can be presented at a power generation conference. Unlike the report audience, this audience must be told from the start why this study is significant. Like the report audience, they know basic power industry terminology. A paper presented to the American Chemical Society on combustion properties, on the other hand, must define any power industry terms used. The slants of these two papers are also quite different. The power conference paper emphasizes why and how this new fuel could be used to generate electricity. The American Chemical Society paper concentrates on novel aspects of the fuel's combustion properties.

Detailed or highly technical articles can be developed from report sections dealing with specific aspects of the study and published in scientific or engineering journals. The methods section, with a short introduction and conclusions added, can become an article in one of the division journals of the American Society of Mechanical Engineers.

By changing the level of detail and the slant, any of the above forms can serve as the basis of one or more trade magazine articles. The paper to the power generation conference can easily be converted to an article in an electric utility trade journal (e.g., Power Engineering Magazine). The same paper can be converted into a chemical trade journal article by changing the slant to emphasize how this fuel could be used in industrial boilers. A coal industry journal might be interested in an article on the fuel itself.

Highlights of these forms can serve as the basis for articles in the popular press (ranging from Scientific American through Discover to the newspapers) or for a brochure. Any of these forms can also be developed into a speach for a public group (a school, a voters group, or a service organization) or even into a film. The base report can be developed into a seminar, either in-house to educate the company's engineers on the new developments or out-of-house. The base material also can be developed into presentations to potential clients or customers, with reprints of previously published forms serving as handouts. Sections of proposals can be developed in a similar fashion, with the reprints serving as appendixes.

CONCLUSIONS

Companies typically develop reports, papers, journal articles, seminars, brochures, and proposals independently, even when they cover the same subject. The multi-use concept eliminates this duplication of effort by developing new forms from old. This represents a significant cost savings, a savings that can be increased if a technical writer performs the conversion. The multi-use concept enables companies to reach wider audiences more efficiently and it provides technical originators and technical writers with opportunities for professional growth. Technical originators can disseminate their work with little effort and technical writers can achieve greater job satisfaction, increase their technical knowledge, and expand their professional repertoires.

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The Benefits of Publishing in Trade Magazines

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ABSTRACT

Publishing articles in trade magazines is perhaps the most cost-effective means a company has to make itself known. An article placed in the right magazine reaches more interested people for less money than any other marketing tool. The fact that a published article has been reviewed and found worthy by a respected, independent third party (the magazine) gives the article's message credibility and enhances the company's prestige. The low cost of producing an article can be reduced further by involving technical writers in its development and by developing it from existing materials such as other articles, conference papers, or reports. Articles--powerful marketing tools in themselves--become truly effective when used as part of a well coordinated marketing program, where they can perform a key role in advancing a company's interests.

Publishing articles in trade magazines is perhaps the most cost-effective means a company has to promote its interests. An article placed in the right magazine reaches more interested people for less money than any other marketing method. Publishing articles enhances the prestige of both the company and the author, and demonstrates their expertise. It provides beneficial exposure in the marketplace and reader response can be developed into valuable client contacts, leading to business that will pay for the article many times over. Altogether, trade magazine articles are powerful marketing tools.

CHEAP AND EFFECTIVE MARKETING TOOLS

Several magazine editors have admitted that articles are an effective form of advertising -- a significant admission from people for whom paid advertising is an important source of revenue. In many ways, articles are more effective than paid advertising; they have advantages over other similar forms of promotion as well. Advertising tends to carry a stigma of self-interest; people often will resist its message because they know they are being sold something. Articles, on the other hand, are a form of technical journalism; they are fairly objective presentations of factual material -- material that has been reviewed by an unbiased third party (the magazine) and found worthy. Magazines enjoy a fair amount of prestige, and an article and its message share it. Professional society conference presentations enjoy similar prestige, but where a presentation may reach an audience of a few thousand, properly placed articles can reach an audience of tens of thousands.

Effective use of reprints can expand this audience; they are also relatively inexpensive and can be used as handouts at presentations, seminars, and workshops, and as appendixes to enhance proposals and reports. Reprints also can serve as effective, credible, low cost brochures.

Another important advantage of articles is that they reach this large audience at a fraction of the cost of most other forms of promotion. All the work can be done in the office; articles do not involve expensive trips and related expenses. Trade magazines handle publication and pay most production costs; many even pay authors a small honorarium for their efforts. The company need only provide text and graphics, and magazines often redraw figures, making it unnecessary for the company to provide camera-ready copy.

This low cost can be reduced even further by use of the multi-use concept(1), which involves developing articles from existing materials. Text and graphics from existing reports, conference presentations, or other documents often can be reshaped into placeable articles. A few magazines will accept previously presented conference papers and will rewrite them for the author, but most want fresh material, requiring some rewriting on the company's part. The multi-use concept greatly simplifies this process. A new slant, a little reorganization, and/or the addition of new material may suffice, and any of these tasks can be accomplished readily by an experienced technical writer.

Using a technical writer to develop articles can further reduce their cost. An experienced writer can perform the necessary tasks efficiently, and a writer's time is usually less costly than that of an engineer or scientist. The engineer/writer team approach(2) to producing documents is an effective way to involve the writer in the development of an article. According to this approach, the technical writer and technical originator work together to develop an outline, then the technical originator provides the information (orally and in the form of existing reports, papers, etc) that the technical writer needs to create a draft. The originator reviews the draft, makes corrections, and fills gaps, if any, then the technical writer completes the task based on these comments. Adapted slightly, this approach is also an effective way to produce articles by reshaping existing documents.

This approach gives the writer the opportunity to learn enough about the subject so that he or she becomes capable of generating additional documents on the subject with minimal input from the technical originator. In this way a whole series of articles, brochures, news releases, and other marketing tools could be generated quite inexpensively from the original article. The article could serve as the physical basis for a whole marketing program.

PART OF A MARKETING PROGRAM

Magazine articles can also perform a key role in a marketing program. Articles have several applications as marketing tools. A company developing a new product, service, or system can introduce it in the marketplace by publishing articles about it. A company can publish news articles about planned, on-going, or recently completed projects. Articles can be used to advocate a point of view, whether technical or political. Articles can be published supporting or opposing legislation, regulation, public policy, or use of a technology. A company can build and strengthen client relationships by publishing articles that showcase client projects and/or feature a client as co-author. A company can establish or groom market and public perceptions by publishing articles. For example, a company may be so well known for work in one field that it is not perceived as expert in any other. This perception would be a severe disadvantage if the company wanted to penetrate new markets. However, this perception could be changed by a marketing program based on a series of articles highlighting the company's expertise and experience in whatever field it wishes to enter.

Although articles are excellent marketing tools, they have limitations when used alone. Authors cannot always say everything they want in exactly the way they want in an article. Magazines probably will not be interested in articles about products or services that are not unique in some way, yet being unique is not necessarily a requirement for marketability. Timing the publication of an article is more difficult to control than timing press releases, direct mailings, or even the publication of advertising. Magazines only publish a few articles in each issue, some of which are staff written and most of which are selected long in advance. Even after an article is accepted, it may be "killed" (cancelled) for any number of reasons. Magazines often edit submissions or request that an author revise an article so it will meet their needs. This review and selection process, and editorial independence help give articles their credibility. However, some material is better communicated by other methods.

Therefore, articles are most effective when used as part of a well coordinated program. In this way a company can orchestrate the release of information via a number of forms to communicate a message or to create and maintain a favorable perception. For example, a company could announce a new service by a press release and paid advertising. Concurrently, a series of direct mailings could inform existing and potential clients; a brochure could be developed to support this effort. At this point, papers could be presented at conferences to demonstrate the feasibility of the service and establish technical credibility. Next, a series of magazine articles could be published on the subject, perhaps referencing the technical papers previously presented and placed in magazines read by the broadest possible spectrum of the potential market. Finally, the company could host a seminar on the subject and offer to make presentations to interested parties at their places of business. Magazine and technical paper reprints could be used as handouts at these presentations, and as attachments to proposals when the time came to go after specific jobs. The emphasis here is on laying the groundwork so that when potential clients receive those proposals, they are already familiar with both the company and the service, and impressed by them. The seeds of a positive response are planted long before the potential client is approached; ideally, the client is sold before the offer is made. Publishing articles in magazines can be a key to this success.

PROPER PLACEMENT FOR MAXIMUM RESULTS

If magazine articles are to have the desired market impact, it is essential they be published in magazines read by people who influence the purchase of the goods and/or services the company offers. Most areas of business and technology are served by several publications, and the same goods and/or services may be of interest to more than one area. For example, spare parts management is of interest to utilities, members of the chemical processing industry, manufacturers, and so on. The company must identify what area or areas represent potential business and what magazines service those areas. An article need not be limited to one area; several versions can be published in different magazines targeted to different audiences.

The first step is to develop a list of magazines that service the field or fields with which the article deals. The author probably will be familiar with some of these; others may be identified through research at a metropolitan or university library that maintains a collection of trade magazines. Once this list is developed, it is necessary to determine which magazines might serve the goals of the article best. The editor can provide information on a magazine's editorial policy and the kinds of articles it favors. The magazine's circulation audit also can provide valuable information. The circulation audit is conducted by an independent agency, such as Business Publications Audit of Circulation, Inc. (BPA) or Audit Bureau of Circulation (ABC), and provides a description of the magazines's editorial policy and audience. A circulation audit also provides a numerical breakdown of the magazine's circulation by industry, geography, and position in the firm, among other categories. It is used by advertisers and advertising agencies to help them decide where to place their ads; most trade magazines subscribe to an audit and will provide a copy on request. It provides a good indication of readership, although it must be used with some discrimination. For example, some technical societies publish trade magazines which they provide to all their members, interested or not. Many will simply throw the magazine away when it arrives. Therefore, a circulation of 100,000 does not necessarily mean that 100,000 people read the magazine. Some magazines can also provide copies of their Media Comparability Council (MCC) Media Data Form, which provides information similar to that in the circulation audit as well as the qualifications of the magazine staff and the quantity and content of editorial pages. Many trade magazines also publish other types of circulation information, such as subscriber profiles and the results of various kinds of reader response analyses, which are also generally available on request. These materials are very helpful in determining appropriate targets for an article, but as they are often promotional in nature, some judgment must be exercised in their use. Finally, looking at a few issues can give a good sense of what the magazine wants and whether it is an appropriate forum for the message.

The more articles a company publishes, the more sophisticated it will become at placement. Reader response should be monitored to determine which magazines reach various audiences most effectively. This can be as simple as periodic calls to authors to see if they have been contacted, or as complex as a reader survey. The company should become familiar with a broad range of publications in order to be able to reach the audience most interested in a given subject.

Once a target magazine has been chosen, the editor should be contacted to see if the magazine is interested in the article. Most prefer to look at an abstract or outline before they will agree to look at the full article. If the editor is not interested, others should be approached. An article may be rejected for a number of reasons that have nothing to do with its quality. The magazine may have published a similar article recently, or plan to publish one soon. The article may not fit in with what they have planned for the next few issues, or they simply may not have space for it.

If the editor is interested, the author should submit the manuscript in a reasonable time (e.g., 1 month rather than 6) and be flexible with regard to revising the article to the editor's needs, as long as the suggested revisions do not compromise technical accuracy or the company's goals for the article. Galleys, copyright transfer, and biographical information should be returned promptly so the magazine can meet its deadline. This not only helps to ensure publication of the article, it establishes a good working relationship with the editor. This relationship can be a benefit to both the company and the magazine, and can enhance success of the program.

CONCLUSION

An article placed in the right magazine reaches more interested people for less money than any other marketing tool. The fact that a published article has been reviewed and found worthy by a respected, independent third party (the magazine) gives the article's message credibility and enhances the company's prestige. The low cost of producing articles can be further reduced by involving technical writers in their development and by developing them from existing materials such as other articles, conference papers, or reports. Powerful marketing tools in themselves, articles become truly effective when used as part of a well coordinated marketing program, where they can perform a key role in advancing a company's interests.

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Converting Technical Reports to Magazine Articles

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Abstract

Many technically oriented persons who accept the documenting of their work in technical reports as part of their responsibilities would consider the writing of a trade press article a difficult challenge. Most report authors do not realize that they have already done most of the work required for an article since their reports contain most of the information needed. Basically, all they have to do is to change the format, add a few explanations, and improve the clarity of obscure sentences and figures. The amount of work required will vary from report to report but should always be less than required to write the technical report.

This paper shows how almost any report documenting a new procedure, technology, machine, system, or application can be easily converted into a publishable magazine article. The paper first compares reports and articles in such key areas as purpose, audience, subject, format, style, and figures. If an author understands the differences between the two, he can easily see how he can turn a report into an article.

Next, the paper gives 10 easy steps for converting the report into an article. Additional examples of the differences and conversion steps will be given in the presentation.

Many people are frightened by the thought of writing an article for a magazine. Yet most of us are surrounded by many magazine articles already 80% written, waiting to be completed. These embryonic articles are the technical reports used to document most technical projects.

There are several reasons why technical reports are the best single source for magazine articles: they are usually reporting on something new; they are written by someone who is knowledgeable; and they contain more technical information than needed in a magazine article.

However, a technical report is not a magazine article. In this paper, I will examine how they differ and what you need to do to convert a technical report into a magazine article.

How Trade Press Articles Differ from Technical Reports

Although some of the same things apply, we will address the writing of technical or trade press articles rather than those in consumer magazines such as *Reader's Digest, Sports Illustrated,* and *Woman's Day.* If we first look at the differences between reports and articles, then we can easily understand how to turn reports into articles.

- **Purpose.** The common bond between technical reports and articles is revealed if we ask why people read articles and reports. Generally, people read both for the same reason: to pick up ideas that will help them do their own jobs better, easier, or for less money. They're not interested - really - in what you or your company did or in acquiring information on a subject unless they think this information will help them solve some of their problems. The closer the connection between your article and your readers' problems, and the sooner they think they will be able use your ideas, the greater will be their interest.

- **Audience.** Although most people read both articles and technical reports for the same basic reason, there is a difference. The reader of reports is more apt to know something about the subject and be looking for details; the article reader, on the other hand, may be relatively uninformed and only mildly interested. As the author of a magazine article, it is part of your job to rouse the reader's interest before he turns the page, to convince him that he should read the article. Also, you may need to define a few terms and provide some background information that the reader will need to understand your article.

- **Subject.** An article may be about a new technique, technology, machine, program, system or application; or it may be a tutorial, which will lead to job improvement through a better understanding of the subject. However, the second type requires greater knowledge, is more difficult to write, and is used less by magazines.

Technical reports are less suitable for magazine articles if they emphasize

- Theory
- Procedures
- Mathematics
- Programming details
- History
- Anything so oriented to *your* company that it cannot help solve someone else's problems

However, even some of these reports can be converted into publishable - although perhaps not outstanding - articles by doing a little more work.

There is also a difference in emphasis. Technical articles, which can be a reference or even a "how-to" manual, usually are longer and include more technical details. Articles tell you *why* something will solve a problem and *why* you should use it (advantages); reports tell you *how*.

- **Format.** Magazine articles use a quite different format than technical reports. The report introduction may state the problem or only the solution, leaving it to the reader to find a problem for which the proposed technique or technology could be a solution. If included at all, any advantages to be gained will usually be in the conclusion at the end of the report. In magazine articles, these advantages need to be given to the reader as early as possible to interest the reader in reading the article. Most technical reports would also benefit by introducing the benefits earlier.

  Reports use more headings than articles, often with many numbered levels, such as 5.2.3.1. Some of these headings may be followed by only one or two sentences. These headings are distracting and often interrupt the flow of the ideas being presented. However, with technical reports, ease of reference may be considered more important than ease of reading and continuity.

  Most technical reports use too many lists, usually with the items numbered. In magazine articles, most of these should be done away with or, at least, converted to bulleted rather than numbered lists. I have violated this rule in this paper because I thought I might need to refer to specific items in the list in my presentation of the paper.

- **Style.** Both reports and articles should be easy and enjoyable to read, free of unexplained terms and acronyms. However, most reports contain more jargon than would be acceptable in an article. In addition, report writers stick to the facts, while article writers give their imaginations more rein - use more comparisons, figures of speech (like "give their imaginations more rein"), try to anticipate results, and identify with readers' feelings. You will not need to rewrite the technical report completely but you may need to expand or embellish it in a few places, and you will probably need to rewrite the introduction.

  Many of the nitty gritty details in the report will not, of course, survive in the article. Don't tell us what happens to Bit 5 at times T1, T2, T3, T4, T5, and T6 unless this is really crucial to the main idea of the article. We don't want to know. You should read several articles in the magazine to which you are sending the article before starting to write.

- **Figures.** Compared to reports, the figures in articles are usually less complex, with no unnecessary or non-standard abbreviations or acronyms. If you must use an abbreviation or acronym, put an asterisk after it and explain it on the same page. Most magazines also use color. Make color functional by using it to convey a third dimension of information, not just to make an illustration pretty.

Steps for Converting a Technical Report Into a Magazine Article

Here are 10 easy steps for converting a report into an article. Everyone writing an article from a report will do most of these things, although most people would probably describe the items in a different way or list them in a different order.

1. If you are not the author, *look over the table of contents* until you understand the report's organization. If you wrote the report, begin with the second sentence in Step 2 and skip Step 3.

2. *Read the report* and *put question marks* wherever you do not understand something or you think information is missing. *Underline key phrases and sentences. Draw a vertical line in the margins* beside the parts of the report that you think you might want to include in your article.

3. *Ask the author the questions* that you have flagged in the report. Also ask him *what is the most important, what is new,* and *what would be of greatest interest* to someone else in another company.

4. *Sharpen the focus* for your article. Is the subject of the report too broad for one article? Should you concentrate on just part of the report? Some reports can become the basis of two or more articles. Others can also become more than one article by changing their "slant." One report that I worked with was on techniques for photographing the separation of blood cells. One article was published in a photography magazine and a somewhat different article in a medical magazine.

5. *Try to make your subject identify more with the reader's interests and problems.* One way is to make the title suggest some action that the reader might be able to take, using the ideas in your article. (The editor of the magazine has the final word on the selection of the title but an "action title" will help you focus your thinking while writing the article. If you think of a good title, the editor may thank you and keep it.) For example, I once wrote an article from a report entitled "Analysis and Implementation of an All-Pass Network Used for an Equalizer." The title of the article was "Develop your own effective delay-distortion equalizer."

6. *Make an outline* for your article. This will be easy because you have the headings in your report as a guide. However, you will probably only use a few from the report while creating several new ones. One or two levels is usually sufficient for an article; a report often has four or more levels. You will not want to use some parts of the report and to change the order of other sections.

7. *Write the introduction.* This is the most important and time-consuming part of the job. The introduction must do several important things with few words: it must attract the reader (along with the title), convince him that he should read the article, give him any definitions and background he needs, introduce the problem and proposed solution, and hint at some of the advantages of your solution. However, most of these things you can only introduce in the introduction (which sounds logical.) Except possibly for definitions and background, you will have to return to these subjects later in the article where you can devote more time to them. The introduction can be considered as a kind of microcosm of the entire article.

   If you lack some information, such as a definition or explanation, you will need to get these from some book or from someone who is knowledgeable. Look at the report's abstract and conclusion to see if they contain information that should go in the introduction. They often do.

8. *Look at the figures* in the report to see what ones would be suitable for the article. Reports usually have too many figures, yet may not have the right ones. You will not want 11 graphs of the signal-to-noise ratio. Do you need a basic block diagram not in the report? Are there any other figures that would be helpful? Would photographs add anything? Ask the author for ideas if you did not write the report.

   Try to simplify the figures from the report that you do use. Some of the information in them may be confusing or unnecessary. Do away with or explain acronyms and abbreviations unless *all* of your readers will understand them.

If you do not complete all of the diagrams before you write the article, at least have a list of the figures so that you will know how and where to refer to them in the text. Your figures will need figure numbers and captions.

9. *Write the article,* following your outline and using what you can from the report. You probably will be able to transfer much of the report right into the article. However, you should eliminate jargon and abbreviations, and define acronyms that you cannot drop. If a sentence or paragraph is awkward or not clear, improve on it. Be sure that you put in transitions between paragraphs to tie them together so that the ideas flow. As you finish a section of the report, draw a line through it.

10. *Review the technical report,* particularly the sections that you have not crossed off, to see if you have left out anything that you want to include in your article.

Completing these steps should be about everything you will need to do to convert any technical report to a trade press article. You will probably modify this list some to reflect your own personal approach and writing style.

But this should get you started. Good luck!

Why Not Recycle Company Reports into Trade Magazine Articles?

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Company reports can often be recycled for other uses, including potential articles for publication in trade magazines. The concept is valid and can serve the interests of both the company and the magazine. Of course, the procedure is not simple; it may require a lot of work. Usually, the author will have to supply a complete rewrite in order to obtain magazine acceptance. However, if the author uses the company report as a source of information and knows what type of manuscript a particular editor is likely to accept, the effort can be successful.

Many trade magazines depend on receiving articles written by contributors—engineers, or other professionals who work at companies or organizations involved in the particular trade. Often, management of those companies will not or cannot permit potential authors sufficient workday time to write adequate articles. In addition, the honorariums paid by trade magazines are not enough to influence potential authors to write at home. Yet, usually, both companies and employees want their work to be published.

One solution is to convert company reports into potential magazine articles. However, that procedure is not as simple as it may seem. It can require a lot of work.

WHAT IS A "TRADE MAGAZINE"?

Before we can discuss whether or not internal reports can be used or converted into trade magazine articles, we have to define just what a trade magazine is, or perhaps more important, what it is not. Also, we have to understand where trade magazines are in the hierarchy of technical publications.

There are three basic categories of technical magazines:

- the scientific journals—such as the IEEE Computer Society's *Computer* magazine, the *Transactions of the IEEE*, or ISA's *Intech;*
- the trade magazines—such as *Computer Design* and *EDN;* and
- the consumer magazines—such as *Popular Mechanics, Popular Science,* and *Personal Computing.*

Each category covers a broad range and many magazines fit between the basic categories defined here. For instance, the last category really includes *Scientific American* and *High Technology,* although those magazines are many steps higher in writing quality and their level of technology than the *Popular Science, Popular Mechanics,* and *Popular Computing* examples.

Articles in scientific journals tend to be research oriented. They provide an opportunity for authors to tell their peers about their studies. Even more importantly, they provide scientific or academic recognition and meet the requirements of some scientific organizations and most colleges or universities for their staff members "to be published." The reading level of these articles is very high, and often the verbiage is decipherable only by PhDs. Moreover, the articles are read by a relatively small number of people, if at all.

Consumer magazines—and some trade magazines—depend on newsstand sales for success. Subscriptions and ads pay a large portion (if not all) of the production costs, while impulse or newsstand sales provide the profit. Their articles must be understandable for the nonprofessional reader. They must also attract people who do not have a high level of knowledge in that particular area—even though those people may be technically educated in other areas. For example, many highly trained physicians, lawyers, and dentists read *Popular Computing* or *Business Computing* to learn how to use computers. They read the *AMA Journal,* the *New York Law Journal,* or *Dental Economics* to maintain status in their own professions.

Trade magazines fall somewhere between the scientific journals and the consumer magazines. I say "somewhere" because the range is broad and there are magazines at every level within that range. *Computer Design,* for example, has chosen its niche about one quarter down from the scientific journal level. However, its 1983 Premier and Special Editions on "Automation & Control" and "Office Systems Design" are about midway in the range. *Electronic Design, Mini-Micro Systems, EDN,* and *Electronics* fit near midrange, some above and some below. Each has a specific niche and serves it well.

HOW TRADE MAGAZINES OPERATE

If any trade magazine is to survive, it must contain paid ads. To sell those ads, salespersons must prove to marketing managers or advertising agency space coordinators that their particular magazine is the best place to advertise, and that the magazine is read by the people those ads are intended to reach.

When a magazine is organized, its publisher must first identify the target audience. Then, a product must be prepared to satisfy the reading requirements of those people. Even an established magazine must periodically reidentify its readers to be certain it is reaching the people its advertisers expect. That is not simple. It may require a large subscription staff and hundreds of thousands of dollars each year.

Usually, electronics engineers read electronics magazines, doctors read medical magazines, attorneys read law journals, mechanical engineers read mechanical engineering magazines, and plumbers read plumbing magazines. However, there are many divisions and subdivisions within each subject area. For example, although there is usually about a 25 to 30 percent overlap, *Computer Design, Electronics, EDN, Electronic Design,* and *Mini-Micro Systems* each has its own dedicated readers. Yet, all those magazines compete for the same advertising dollars.

Each trade magazine, then, is chartered to serve a particular group of readers. How well it serves those readers influences whether or not the magazine is read. That in turn influences ad revenue—and whether or not the staff gets paid. The articles published in a trade magazine differ from those in a scientific journal as well as from those in a consumer magazine. However, their contents also differ drastically from those in conference session proceedings or a company report.

RECYCLING COMPANY REPORTS

On the surface, multiple use of papers sounds great. Why *not* use the same material for internal reports, contract proposals, conference papers, and magazine articles? It is paid for, why not get more profit?

Certainly, it can be done, but it is never easy. Each type of document requires a unique presentation—and often different information.

Internal reports tend to be lengthy and verbose. These reports usually serve two purposes: to explain what has been done on a project, and to promote the skill of the project managers in order to prove that they have done commendable jobs and deserve raises or promotions.

Proposals for new contracts may include much information from reports on past contracts, but they are usually rewritten to an even higher level of verbosity and governmentese—mostly double-talk. After all, neither party wants to be held to the agreement. If the statements are muddied enough, whichever side is sued can claim the specs were not clear.

If you doubt these last statements, do a Gunning Fog Index check on any internal report and any contract proposal. A result under 20 for the first and even 25 for the latter will be surprising. (A rating of 17 is the highest level Gunning uses because anything over that is supposedly unintelligible.)

Magazine articles, however, must be written at a lower Fog Index level. Society or scholarly journal articles may have Fog Indexes of 18 to 20. *Scientific American* may be about 12, and *Popular Mechanics* will probably be 10 or lower. That is not a put-down on those magazines. Each publishes for certain readers. *Scientific American* editors, however, maintain the 12 level despite the ability of many of its readers to understand the content at a much higher level. Those readers might willingly read and understand articles in the *Transactions of the XYZ Society*. Yet, they do not want to expend that much effort when reading *Scientific American*. Like many other highly educated persons, they read *Scientific American* because it is easy to read and to understand. They read it to educate themselves in broad scientific areas. However, they are enjoying it.

Most trade magazine articles range from 14 to 18 in the Fog Index. *Computer Design* has in the past year moved from a 17 to a 15—and in some articles to below 10. It was not easy. Now, all staff editors have a copy of Gunning's book on their desks, every editor from the editor in chief to the newest copy editor. We will probably never reach a 12 overall. We will probably not want to, because readability involves more than a low Fog Index. Yet, a 14 would be nice. Certainly we do not want to stray above 15 often. (By the way, an average of three samples of this paper had a Fog Index of 12. Some portions probably are higher; several are much lower.)

It is also very important that all potential authors know the magazine before they prepare manuscripts or outlines. This is true, too, for the agencies who are paid to place articles (whether written by the "author" or by a ghost writer at the agency).

Different trade magazines publish different types of articles. For example, *Electronic Design* and *EDN*—both broad-scope electronics magazines—publish application and product analysis articles that are of interest to a wide range of readers. *Mini-Micro Systems* tends more toward systems and end user oriented articles. All also lean toward survey articles. Each meets specific reader requirements in somewhat different ways, but all serve their readers well and are fine magazines.

Another excellent magazine, *Design News,* covers all areas of both mechanical and electronic design technology. Articles in that magazine vary broadly in scope—from microprocessors to aeronautics. Yet, most are design oriented.

Computer Design, as its name implies, is also design oriented. However, it concentrates on digital technology. Many times it has been called a hybrid—a broad vertical or vertical broad—magazine. It covers all of the broad computer market, yet it does so only from the OEM aspect. (Original equipment manufacturers are the companies that use components, subsystems, or even small systems made by other companies to build large quantities of subsystems or medium to large systems for still other companies.)

Premier or Special Editions of *Computer Design—Automation & Control* and *Office Systems Design*—are each dedicated to single application areas. They also lean more toward the end user, although design aspects remain. They do not publish case histories, per se. Their articles could probably be called application with technical and design content.

By studying a chosen publication carefully, authors can determine exactly what types of articles that magazine publishes. Then, the author (or the ghost writer) can prepare a manuscript to fit that magazine's formula.

DO MAGAZINES WANT RECYCLED REPORTS?

There is no universal attitude among trade magazine editors toward publishing converted company documents. Of course, those documents might be in any of several forms. Some might be project reports, others might be articles published in company journals. Moreover, the latter might have been converted from the former.

A few editors have no qualms about publishing such documents almost verbatim. Others will not accept them unless completely rewritten. However, most editors will at least read the manuscripts and, if salvageable, recommend revisions before publication.

At *Computer Design,* for example, we would not even consider publishing a company project report. However, our editors would probably read such a report and possibly suggest an article based on some phase of the report. This is most likely to result from a plant visit by one of our field editors. Often, those editors or other staff members are given proprietary information or are allowed to read company-classified reports because of our reputation for honoring "not for publication" disclosures. That reputation has permitted *Computer Design* (and other "respected" magazines) to publish descriptive articles on a technology subject almost at the same time the general information is released to the general press. We might have had the information on a nondisclosure agreement for months. In fact, we would need to have it at least three months before the publication date in order to process the manuscript properly.

Republishing articles that have been published in a company journal or presented at seminars is another matter. Our attitude toward such articles depends on the current value of the information and the number of article copies that are distributed. If the information is of value and the company journal is sent only to company personnel, or the seminar was attended by only a few hundred persons, we will consider republishing it, usually with revisions. However, if the journal is sent to several tens of thousands of employees and potential customers, we would likely not consider republishing the article—no matter how valuable the information—unless it were thoroughly rewritten.

Yes, trade magazines will—sometimes—publish articles based on recycled company reports. However, some proclaimed concepts for recycling may be too simplistic. For example, "...all the authors have to do (to a company report) is change the format, add a few explanations, and improve the clarity of obscure sentences and figures." Wrong. "All" in that statement could be more difficult to carry out than a complete rewrite of the report. In addition, those simple changes could result in a manuscript that was so obscure as to be unusable. A good trade magazine article would be merely *based* on the report's content. A complete rewrite would be necessary. However, that would still be relatively easier than starting from scratch.

Another partial misconception: "...the article reader (unlike the reader of reports) may be relatively uninformed and only mildly interested." This is true for articles in consumer magazines. It certainly is not true for scientific journal articles. Moreover, it is only partially true for trade magazine articles.

However, the writer of the above statement added: "...the article author must arouse the readers' interests and convince them to read the article." That is so true as to be the key to any article, whether a rewrite or entirely new.

At *Computer Design* we use a series of contact items to reach and hold the reader. First, for those readers who check the contents pages first, we include the article's general topic, title, byline, abstract, and starting page number on the contents page. We, of course, repeat the article title and deck (abstract) on the first page of the article. Then, we begin the article with an interesting and descriptive introduction and (usually) some colorful art.

Our plan is to lead the readers into the article, but then we have to hold them. That is done by carefully editing and organizing the material. Sometimes it works; sometimes it does not. If readers are really not interested in the subject of a particular article, nothing will force them to read it.

We also periodically pay for research studies of certain *Computer Design* issues. Part of each study provides data on the percentage of readers who read each article, broken down to first and all succeeding pages since not all readers finish reading each article. In addition, every month we ask readers of each article to circle numbers on our reader service card to indicate how valuable those articles were to them in their work.

THE FINAL POINTS

In general, it is possible to convert a company report into a trade magazine article. However, it would be a lot easier to convert it for a scientific journal. I am not trying to discourage you. I am just trying to show you that the conversion will not be an easy one—that is, if the article is to be accepted and published.

For your information, however, we reject a large percentage of the manuscripts, outlines, or article ideas that we receive—perhaps 50 percent or more of the unsolicited ones. We even have to reject solicited manuscripts if they do not meet our requirements. For example, for our *Office Systems Design* issue, I solicited manuscripts from 32 authors or companies. I knew many of those solicitations had practically no chance of fulfillment. However, I received 16 manuscripts, rejected 5, and kept 1 as a backup. Of the 10 we published, two were works for hire (contracted articles) while a third was staff written. The authors of the rejected articles ignored the requirements that were given to them when the articles were solicited.

Rejecting those articles hurt. I really wanted at least two of them. However, they did not meet our standards and we never knowingly lower those standards. In this case, the manuscripts were received too close to deadline to allow the major revision that would have made them acceptable.

Again, we want articles, and so do all of the other trade magazines. We and most other trade magazines have backlogs of good manuscripts. Yet, we always need more. Therefore, please do not take my presentation as a turnoff. We can afford to be choosy. We must be. However, we cannot afford to reject manuscripts out of hand. If you want to submit a manuscript, outline, or story idea, we will read it and at least *consider* it for possible publication. If we reject it, we will tell you why.

As a final bit of advice, whether you are writing a manuscript or revising a report, submit an outline to the magazine first. If your potential article is not acceptable to the magazine, it is better to know before you spend the time writing it.

A Systematic Approach to Editing

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In this workshop you will learn an editing technique that helps you to focus on one aspect of a document at a time. This technique will help you to avoid the reediting that occurs when you find problems that you should have checked for on previous pages.

You will edit a sample document using the editing technique and a style guide. We will discuss the results of your editing exercise and the merits of the editing technique.

Come prepared with a fistful of your editing implement of choice. Leave the 31st ITCC as a more efficient and productive editor!

Editors of technical documents often have to be aware of many aspects of the document simultaneously:

- Organization
- Adherence of style and format to company guidelines
- Grammatical accuracy
- Completeness of the index

In this workshop, editors learn a technique that helps them be more productive while editing a large document. Using this technique, editors review a document in eight steps or passes, focusing on a single aspect of the document during each pass. After systematically editing the mechanical elements of a document, the editor can perform more efficiently the traditional procedures of editing for style and grammatical correctness.

The editorial passes are as follows:

1. Organization and structure of headings in table of contents
2. Front and back matter
3. Lists used in text
4. Commands, options, or whatever they are called
5. Figures and tables
6. Text body, including appendixes
7. Message reference lists, if included
8. Index

By concentrating on the mechanical elements of the document (passes 1-5), editors can concentrate on editing the body of the text in pass 6. The net result of this editing procedure should be a faster and more thorough edit of the document.

Writing Documentation before Producing the Product

William A. Mattingly, Moderator

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Because many documentation writers lack clout in their companies, they are not involved in a project until the end of it. Even then, they may have little to say about the documentation design. Therefore, many writers struggle trying to document poorly designed systems. During this workshop we will examine the issues surrounding this dilemma and offer solutions to it.

To provide a context for our discussion and an opportunity to see others solve the dilemma, those attending the workshop will participate in a guided design. Along with the characters in the scenario, you will work in teams to solve the "clout" problem. Through a feedback process, you will have an opportunity to learn from others as well as review solutions offered by the characters in the scenario. Many who have used a guided-design approach report that it is an efficient way to involve people in a complex problem and to bring out the best ideas for solving the problem.

During the workshop, you will learn concrete ways for getting involved in a project early. You will also learn how to help technical people design systems that work well for people. While many of us believe that writers should become involved with product design, many are not trained to do so successfully.

Therefore, to help you improve your professional skills, we will suggest ways you can increase your knowledge about psycho linguistics, cognitive psychology, documentation, and system design.

Legal Considerations for Technical Communication

Russell B. Stoner

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Many technical writers, particularly those relatively new to the field, may feel a real sense of frustration at the clearance procedure which the product of their efforts must undergo. Perhaps the three speakers in this panel can convince you of the necessity of a painstaking review even if they can't make it palatable. As they point out, the stakes for the employer are so major that failure to ensure that the organization is protected against possible legal penalties would be dereliction of duty.

Our first speaker deals with the intriguing question of how product liability impacts technical writing. Not only does he address the problem as outlined in case law, but he projects current decisions through extrapolation to possible future problem areas that have not yet been addressed.

Our second speaker considers the question of copyright and corporate release of copyright from the view of the editorial office of a major professional publisher. Questions about the total release of copyright to scholarly journals have been discussed from the writer's view at past ITCC's, so here is a chance to get the publisher's viewpoint.

Our final speaker addresses the clearance procedure with a view of explaining corporate concerns and he attempts to explain how the technical writer can most efficiently cope with the clearance procedure to reduce the time and frictions associated with it.

This panel can be highly recommended for all communicators who have suffered through the red tape of publication clearance and who are looking for ways of dealing with the process most efficiently.

On Language, Liability, and Documentation

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ABSTRACT:

Readability formulae measure word and sentence length, but they are not reliable guides to the adequacy or inadequacy of software documentation. Further, vendors may soon be liable for documentation that leads demonstrably to user errors. This paper describes areas shared by those concerned with readability, product liability, plain language litigation, and software documentation. It also suggests areas for more functional readability testing.

INTRODUCTION:

This paper was written as an attempt to answer several questions about liability and software documentation that were raised by a Denver law firm that is expanding its computer law division. Their questions included the following. Can software documentation be measured by legal standards? Is there an industry standard for documentation? If the documentation can be measured, can that evaluation lead to a clear determination of vendor error as opposed to user error?

Overall, my response was that most vendors have avoided these questions because of the general disregard engineers and managers feel about documentation - that it was for idiots; everybody knows that, etc. We all know from working experience that documentation is the last category to be considered in the manufacturing world, and it is paid the least attention by the engineers who write the software. Beyond this low esteem, vendors have covered themselves with disclaimers. A typical statement reads, "Information specifications are subject to change without notice." Yet it is the case presently that contracts for bundled systems and single software packages increasingly demand a variety of accurate, readable, and up to date documentation.

OVERVIEW:

The question of vendor/user liability for software documentation rests in the area of product liability. Other legal measurements of language may establish precedents. While Military Specifications exist as the longest tradition of documentation that is held to be legally liable, "Mil Specs," as they are known in the field, are thought to be unuseable by all but the military. More recently, plain language laws in New York, California, and Michigan have begun to determine parameters within which vendors may be held accountable for improper and misleading uses of language.

The Fog and Flesch readability formulae offer quantifiable means of measuring readability. However, they have no practical bearing on clarity, conciseness, and most important, accuracy. They can only measure the grade level of the vocabulary required to read the document.

Within the field of software documentation, observations about linearity point to a measurable standard for an entire document. Remarks about typical user's reading patterns also stress the need for linearity.

DISCUSSION:

As the software market broadens to include non-data professionals, particularly in the micro market, we are finding a much wider range of people manipulating information with many more software packages. It would seem that this increase in the user population combined with the desire of vendors to reach that market may lead to litigation over a myriad of aspects of the appropriate use of software. There are four reasonably well discussed areas that depend on the use of language: Product Liability, Military Specifications, Plain Language Laws, and Readability Formulae. After that ground is discussed, I will examine two figures on it - current research in readability and a structured method of documenting software.

Product Liability:

The subject of product liability and its impact on written instructions has a long background in litigation which has been reviewed by Professor L.P. Driskill of Rice University. (1) A brief summary of his major points follows.

The burden of proof falls on the defendant company.

The documents generated in a product's life cycle are the only available evidence that the product was not defectively designed.

Technical writers who prepare any of the attending pre-sale or post-sale documents and any technical specialists involved in product design, development, and testing can be drawn into the arena of product liability and litigation.

Failure to Warn: "...the jury is more easily able to grasp the need for better warnings or directions than to understand the claimed deficiency of a complex design or manufacturing process. The defendant company can less frequently claim that the plaintiff had expert knowledge and was therefore guilty of contributory negligence. Thus, with more cases turning on 'failure to warn,' technical writers will be increasingly involved in the prevention and defense of product liability claims."

Duty to Warn: The sense of "failure to warn" has expanded to include a sense of "duty to warn" which leads to the notion that it is the vendor/manufacturer's duty to warn of potential hazards.

Third-Party Liability of Writers: The possibility of being named as a third-party defendant becomes more ominous because of precedents providing that any ambiguity in the language of a warning furnished in connection with the sale of a product is to be "construed against the one who chose the words used."

Movement to 'Caveat Venditor': 'Let the manufacturer beware.' This principle seems to have been clearly enunciated in a Colorado court in 1979 which decreed "a product which is free of manufacturing or design defects nevertheless may be defective and unreasonably dangerous if not accompanied by adequate instructions or warnings."

Who Must Warn: The obligation of the vendor/manufacturer is somewhat mitigated by two notions: 1) no duty exists where the product is not dangerous or likely to become dangerous in a foreseeable use or circumstance; 2) regular users of the product and those whose professional education, training, and experience have given them expert knowledge of the danger need not be warned.

What Dangers Must be Explained: Of the three categories described by Driskill, the one most applicable to software seems to be "a danger that can be avoided if instructions as to proper methods of use are followed."

The Adequacy of Warnings has been decided by juries. I suspect that convincing a jury would depend on the clarity of the language. Could they, a randomly picked group of people, understand the instructions?

Rudimentary guides for technical writers include
- telling the seriousness of the risk,
- explaining the risks in understandable terms,
- commanding the attention of the user at the point of use.

Driskill's points about product liability and language describe a variety of areas that would become involved in litigation hinging on documentation. At least, they describe the history of litigation over product liability and the technical writer's responsibility.

Military Specifications:

Over the years since WW II, the military has devised whole sets of specifications for documentation that is supposed to accompany different products they buy. "Mil Specs", as they are known, are elaborate and detailed in very arcane ways, and my experience is that people write to "mil specs" only when they have to. This audience does not need to be reminded of their strictures. Certainly, writing to these specifications does not lead to plain language.

Plain Language Laws:

There have been movements in California, Michigan, and New York for the implementation of "plain language" laws. Those attempts at passing legislation in California and Michigan have been strongly opposed by business interests.

In California, Senate Bill 2051 became law on January 1, 1983. SB 2051 requires state agencies to write documents in "plain straightforward language." It covers all documents that are "necessary for carrying out the agency's responsibility under the law." SB 2051 had contained 17 writing guidelines for plain language, but they were stricken from the final bill.

In January, 1982, California's Assembly Bill 1869 failed in committee. AB 1869 would have made consumer contracts void if they were found unreadable. Members of the business community lobbied against the bill.

Plain language supporters in the Michigan legislature incorporated plain language provisions in two laws passed during the 1982 legislative session. The state's new Paperwork Reduction Act includes a plain language standard among the criteria for the review of all state forms. Michigan's new Construction Lien Act dictates the exact wording of all notices and contracts required under the Act, simplifying the language in all of them.

During the same session, the Senate Consumer Committee tabled House Bills 4147 and 4197, which required that consumer contracts and insurance policies be written "in a clear and coherent manner, using words and phrases with everyday meanings."

Although consumer groups and legal scholars testified in favor of the bills, representatives of the insurance and financial industries lobbied against them. Plain language supporters in Michigan hope that the business community's opposition to plain language in consumer contracts will dissipate as the state's simplification of its own forms and contracts proves to be successful. (2)

One of the most successful applications of plain language principles to federal regulations occurred when the FCC marine radio rules for recreational boaters were revised and a controlled study of two user populations was conducted. In general, groups using the revised rules performed more successfully in identifying the proper rules. They were also quicker at answering the questions, and they rated the revised rules easier to use. (3)

My opinion is that as the market for a software product widens and as the consequent need for more "user friendly" documentation increases, these plain language laws will come into play. It would be interesting to see what caused alarm to the manufacturers.

Industry Standards:

To my knowledge there are no clearly formulated standards for documentation that are universally accepted in the computer industry. IBM, Digital, Honeywell, and others have sets of standards that they adhere to, and opinion about any of them is nearly as widespread as the audience one might choose to sample. For example, I do not particularly care for IBM's style because it is not helpful to non-engineering people. On the other hand, I think Digital did a particularly good job in its DT II manual.

For the most part, manuals have been written by people with engineering backgrounds for their own crowd, and it is only lately that serious attention has been paid to the user and his/her needs. As a case in point, Hewlett-Packard insists that their writers have BSEE degrees, or the equivalent experience. The chance of these people empathizing with a non-technical audience seems slim.

There is a dichotomy in the population of technical writers. One group comes from an engineering or scientific background and writes from an expert point of view. The other group comes from literary, academic, or journalistic backgrounds, and they begin technical writing from an uninitiated user's point of view. My opinion is that the best work comes from the latter group because they are able to ask the necessary and naive questions, and, to some extent, to duplicate the user's experience. Many of them are also trained writers when they begin technical work, and that training is hard to duplicate.

Readability Formulae:

There are several formulae for assessing readability. Robert Gunning's Fog Index, Rudolph Flesch's Readability Formula, Fry's Readability Graph, and Western Electric's Writers' Workbench are familiar to most technical writers. None of these quantitative methods of evaluating language allow us to say very much about the quality, clarity, or accuracy of a given text. Jack Selzer in his "What Constitutes a 'Readable' Style?" (4) reviews this literature quite thoroughly and points to the problems found with the Flesch index by many researchers.

He also reviews the idea that short words and short sentences do not by themselves lead to a clear text. His discussion highlights the limitations of word counting methods in assessing the true comprehensibility of a document. He does, however, point to more likely territory when he introduces the ideas that causal relationships between phrases or sentences make documents more understandable, that explicit statements of rhetorical structures such as headings and topic sentences make documents easier to follow, and that elements of the logic of the argument make the most important differences in readability.

The logic of the argument covers a wide range of possibilities, and two of the schemata he discusses provide a theoretical base for assessing readability. The first is the concept of the 'given-new contract" between the writer and the reader:

> ...the given-new contract governs the placement of information in paragraphs and longer texts. According to this implicit contract, writers communicate with readers by agreeing to present information according to a certain format - by attaching it to what has come previously. Thus "new"...information...is tied explicitly to "given" or previously presented or known information.

That concept suggests the possibility of measuring a document by the way it sequences established information with new information. That's a wide territory, I realize, and it contains the potential to be made into a quantifiable measure.

Selzer's second possibility reinforces the first, and it is based on Walter Kintsch's work with propositions, where a proposition is similar to a "kernal sentence" in transformational grammar.

> ...we write texts by combining and arranging propositions into sentences, paragraphs, and larger sequences; on the other hand, when we read, we do it by processing propositions, not sentences...(writers) may be able to use proposition counts to get a sense of the difficulty of their writing. (4)

When these two concepts are applied to the question of a quantifiable measure of readability they suggest that we could identify the propositions in a sentence or a paragraph, or a longer unit, and that we could identify their relationships at least by "given-new contracts" as well as by others that we could specify.

The special demands of technical writing, particularly that people do not read it to remember it, or to savor it as one savors Melville or Joyce, imply limited goals for the reader. Typically, the consumer of technical writing is task oriented. He or she wants to get a job done, and that person wants the clearest and least ambiguous path toward the successful completion of the job. Dr. Edmond Weiss in a workshop manual, Structured Documentation, (5) suggests methods of writing documentation that are consistent with "given-new contracts" and with "proposition theory."

Criteria for Judging Software Documentation:

Weiss's approach is the most theoretically sound systematic scheme of documentation that I have seen, and I will reflect some of his thought as it correlates with my experience and views.

It is his observation that users are not centrally interested in facts, except as they relate to tasks, procedures, transactions, or the pursuit of objectives. In fact, all of the earlier categories fall under the last heading, pursuit of objectives. Users want to know the simplest method of learning a system, and they have virtually no theoretical interest in the software. This puts them at a considerable distance from the software engineer.

Some propositions about documentation follow.

A loss of linearity is a flaw in the documentation. Every time the reader changes direction, whether to go from the back of the manual to the front, or to reread an unclear sentence, the usefulness of the document declines.

Strategic errors in the documentation have occurred when the reader: 1) finds him/herself in the wrong book; 2) skips around hunting for information; 3) is confronted with unfamiliar language.

Structural errors in the documentation have occurred when the reader: 1) struggles with difficult preliminaries; 2) reads selections in a sequence other than the one presented; 3) searches for tables or figures separated from their text; 4) fights through long discursive passages searching for a single fact; 5) rereads passages because necessary background material has been "assumed."

Tactical errors in documentation have occurred when the reader: 1) searches for the meaning of unexplained acronyms; 2) struggles with inconsistent nomenclature; 3) rereads tangled text; 4) strains to relate a figure to the appropriate text.

These propositions describe what happens with the majority of documentation on the market because very little attention is paid by vendors to after-market testing of the documentation. Once the document is in print it will stay there until the product changes, or until there is enough protest from customers about a manual to mandate its revision. Vendors strongly resist paying serious money for good documentation. One well known company in the CAD/CAM field requires its software engineers to write their own documentation, and you can be sure of the engineers' work priorities.

The preceding shopping list of linear criteria provides an exisiting scale for measuring the adequacy of a manual, or a set of them. I suspect that these criteria could be understood by a jury more easily than "Mil Specs," for instance.

Weiss establishes other kinds of criteria which could be used to test the readability of a document. Necessarily, as kinds of statements, they will become mixed. However, the more clearly delineated the statement, the clearer the document will be. We can also see that the preceding list of errors in linearity can fit into both the "given-new contract" theory and "proposition theory." Establishing quantifiable standards will mean joining cognitive language theory with principles of documentation such as those put forth by Weiss.

His method is enlarged as he defines four kinds of documents which, in practice, work better as definitions of types of statements.

> *Why documents* give background and history, and they also explore the advantages of the system and the needs it fulfills. Introductions fall into this group.
>
> *Reference documents* contain lists of information such as codes, commands, programs, error messages, and so on. These documents are usually presented in a dictionary format.
>
> *Tutorial documents* demonstrate how to run sample programs, and they introduce the user to the system.
>
> *How documents* describe particular ways to perform routines. They tend to be the most straightforward of these four types to write.

He makes a preliminary definition of the five kinds of styles which a software documenter might adopt.

> *Linear process* is a description of steps that contain no loops or "go-to" sequences.
>
> *Flow process* is any flowchart that is used to describe loops in the program.
>
> *HIPO* stands for Hierarchical Input Process Output which is a schema dear to the heart of IBM that describes flowcharts within flowcharts within flowcharts.
>
> *Illustration* includes any picture, table, or chart that illustrates a process or part of one.
>
> *Playscript* is a dialogue, or interactive process, established between the reader, the manual, and the program. Typically, one envisions a two column page in which one column displays the prompts on the screen, while the other column describes actions the user may (or must) take. This style will follow a step-through routine for the user.

The concept of linearity in documentation along with its attendant types of statements and styles points to a conceptual frame for both readability studies and for assessment of liability. If the Flesch and Fog indices are thought to be reliable and quantifiable, then much work remains to move principles of documentation such as these to a position that is perceived to be equally reliable.

CONCLUSION:

The technical and professional writer's job is most often to be a translator from scientific and engineering disciplines. This translating act is difficult because it means keeping clear the intentions and methods of the original work at the same time that the writer has to be clear about the needs of the audience.

This paper has suggested areas of shared interest between readability studies, their foundations in linguistics and cognitive psychology, and one method of "structured documentation." All of these theoretical concerns come into play when the question of liability for "the one who chose the words" is considered. If we, as writers, are to become liable for those words it behooves us to pay serious attention to the way those words may be measured. Industry standards do not do the job, however, with applied study in the suggested areas and some common sense about our different audiences and our own experience of reading and writing, this territory contains both a threat and a promise. The threat is clear, while the promise is that the concept of liability contains an authority about "the words" that many of us have earned, but from which few of us have profited.

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The AT&T Divestiture and How It Has Affected Customer Documentation

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ABSTRACT

This discussion focuses on how technical communicators and writing processes are affected by new and diverse audiences and changing product lines.

No industrial event in contemporary times has more touched the lives of as many individual citizens in America than the break-up of the Bell System. And, nothing in recent memory has more radically changed how we, the former members of the Bell System, view our jobs and how we perform them. Those of us in the Document Development Organization are involved in this change more than most.

First, who are we and what is it that we do that might make our experiences interesting to you? Our organization is part of AT&T Technologies, a wholly-owned subsidiary of American Telephone and Telegraph Company (AT&T). Although principally located in Winston-Salem, North Carolina, the Document Development Organization also has departments in Denver, Colorado; Columbus, Ohio; and two locations in New Jersey.

Our technical staff numbers about 1000. Of that number, some 500 are technical writers and about 100 are editors. The remainder are supervisors, engineers, and personnel in information systems, production shops, and clerical support.

Our only product is documentation. It supports the sale, installation, operation, maintenance, and administration of AT&T equipment and services.

Today, I would like to tell you how being in a new and unregulated market has changed the nature of the things we have to consider as we prepare documentation. The lessons we've been learning about such subjects as audience analysis, readability, and the use of the computer in preparing what is popularly known as "friendly documentation" may help you in your work.

Today I've brought with me some examples of the products we've traditionally produced (See Fig. 1.) These examples are standard practices and related materials designed to support the operation and maintenance of equipment used throughout the AT&T telecommunications network. They have all the ingredients of conventional textbooks: written material, figures, glossaries, and appendices. And on the average, they have been pretty stodgy stuff. Our writers have been responsible for researching, designing, writing, and overseeing the production of these documents.

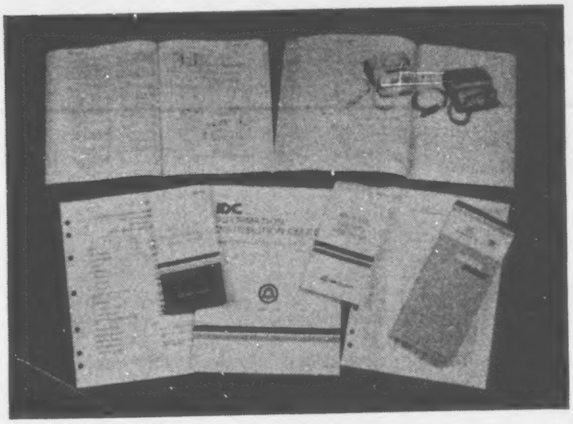


Fig. 1 - Examples of Traditional DDO Documents

But, until this year, our audience has been virtually a captive one — exclusively Bell System people. And, in turn, we were prohibited from serving customers outside the Bell System. Our standard documentation has been couched in acronyms and internal corporate jargon. For our audience, however, our approach, while not necessarily the best, was adequate. But now, our customers who were formerly part of the Bell System are moving into new markets with a wide range of new products — and their documentation requirements have changed dramatically.

In addition, we are now dealing with many new customers who also require documentation customized to meet their needs. These customers are experts in their own fields, but their backgrounds do not normally include the jargon and acronyms so familiar to us. Moreover, their needs are unique and diverse. We have to communicate with them in their language, not in ours.

CUSTOMIZED DOCUMENTATION

CUSTOMER DOCUMENTS
VP-PURCHASING ACME BLDG. CO.
CUSTOMER DOCUMENTS
ACCOUNT MANAGEMENT

"Knowing your audience" has taken on a whole new meaning for us. Everyone here today has heard about audience analysis, and we've all said, "Of course, to write good user documentation, you must know your audience." Maybe some of you are like we were — confident that we knew our audiences and what they needed. But unless you stop and do some real audience analysis and apply your findings to your work, you may be woefully off target. You cannot take comfort in the fact that you've had no complaints — the "no news is good news" idea. No, you've got to get out there and find out if the audience you wrote for is the actual user, and more importantly, if the document is doing what it was intended to do for the user.

These are the realities we've had to face, and we have changed because of them.

What are we doing to meet these new challenges? Our new documentation products (See Fig. 2) are taking on a different appearance, and the information reads differently. We're using a variety of formats, and our writing style is much less stodgy. The necessary technical information is still there, but we're becoming much more sensitive to our customer's needs. More than ever, we are stressing clarity, conciseness, readability — that is, we're striving to improve the usefulness of our documents.

Fig. 2 - Examples of New DDO Documents

Furthermore, in keeping with the rapid advances in computer technology, we are preparing a new form of documentation that will enable the user to select and display information directly from a very large database through on-line terminals. This on-line material, in addition to satisfying the particular requirements associated with its being on-line, must also be presented in such a way that users will have the same confidence in the on-line information that they have had in paper documents.

Getting from where we were to where we are has been expensive and arduous. I want to tell you something about that. But first, let me tell you just a little about our writing staff.

Some of our writers were former employees of what you called your local Bell Telephone Companies. Since these writers were former users of our documentation, they bring a valuable perspective to our writing. They are also technical experts possessing highly sophisticated knowledge about telecommunication products and services.

Others of our writers come directly from universities or technical institutes. They usually have a degree in electronics technology or in electrical engineering. Like many other companies, we've hired a sizable number of computer science graduates as well. Since our newly hired college graduates have good technical backgrounds, we have to do relatively little to attune them to the technology of telecommunications.

But, in the process of taking a deliberate and very serious look at who our customers are and what they need and whether our products are doing the intended job, we discovered some things about our documents and about our writers.

We discovered four categories of problems with our documents: timeliness, accessibility, organization, and content. A perfectly written document is not much help if it is not available when needed. Likewise, a perfectly written document is of little value if the user can't find it. The use of the computer not only in our production processes, but also as a delivery medium, has helped us a great deal with the problems of timeliness and accessibility. But these problems really don't lie with the writer. Document organization and content problems, though, do involve the writers and the skills they bring to the job. These are people problems.

We began to understand that although our people are technically competent, most have not received adequate training or education in writing skills — either before or after employment — to enable them to write technical material that is well-organized, clear, concise, and that meets the needs of our customers. Our response to this problem has included both short- and long-term solutions.

For the short-term, we turned to the academic community, and we received outstanding professional help. This activity laid the groundwork for the training we are now conducting. For the long-term, we are adding courses ranging from basic grammar to expository writing. We are allowing the needs of our customers to shape our efforts in developing new standards and methods. And we intend to emphasize quality assurance in our work to a much greater degree.

I don't think we're unique. The problems we've faced affect all businesses. The signals are unmistakable: writing skills must improve and that means more emphasis must be put into writing education. We are making this point with the academic community at every opportunity.

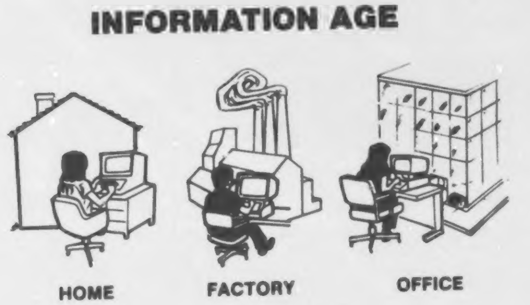
The biggest reality our organization has had to face is that the AT&T divestiture has thrust us into a very different business environment. We have had to recognize that our writers are faced not only with unprecedented technological changes but also with the requirement to communicate complex information to a range of people who have diverse needs, backgrounds, and abilities. But, as I pointed out earlier, most of our technically competent writers have not received adequate training in communicating their knowledge! The skills they require to write for today's market are available only through our organization's firm commitment to provide them.

If what I've been saying strikes a sensitive chord with you, then I offer our experience as evidence that change is possible. The situation is not hopeless. We believe that the programs we have established will succeed. We further believe that when problems are addressed and defined, when solutions are designed, and when follow-through in terms of money and time is provided, writing skills can and will be broadened and improved.

In summary, the most important lessons we've learned in serving new customers in an unregulated market are these:

- Above all else know your audiences and their needs
- Have as your goal, clear, concise, readable writing that works for, not against, the user
- Accept and foster the use of computer-based tools that provide non-creative but essential elements of good writing.

Some are calling this period of our history "the information age." The products and services available to us in just a few years are beyond what we are able to imagine today. Who will document these emerging products and services? Who will communicate their value to the customers of the future? It will have to be those of us who have gathered at this conference and those people we introduce into and nurture within our profession.



Adapting Manuals to a Variety of Audiences: Information Access

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Abstract

Most computer manuals are used for different purposes and by a variety of audiences. How can writers take the various audiences and purposes into account without losing new users or hiding information from experienced users? In the first part of this paper we present general strategies for designing a manual for use by a variety of audiences. In the second part we focus on strategies for developing flexible information access.

Traditionally computer manuals have been written by computer programmers for other computer professionals--as a reference work. With the explosion of computer use however, more and more people, most of them not computer professionals, are using computers and computer manuals. Manufacturers of software and hardware are realizing that systems materials must be directed to a more diverse audience.

Preparing several manuals offers an obvious solution: each could be relatively compact and aimed at a particular task and a particular user group. But writing computer manuals is so difficult and costly an activity that writing and updating two or three manuals, each aimed at a different type of user, is prohibitive. A more reasonable solution to the documentation problem is to write one manual that addresses the primary audience and purpose and also adapts the information for a variety of audiences.

1 General Strategies for Designing Adaptable Manuals

For the past three years, members of the Communications Design Center (an interdisciplinary center conducting basic and applied research in the visual and verbal aspects of language comprehension) at Carnegie-Mellon University have been researching the issue of how to produce effective user documentation. One major outcome of their work is an editing and testing system called Protocol-Aided Revision (PAR) [1,7]. PAR detects problems a user has while trying to work through a draft of a manual, talking aloud during the process. The user protocol points to procedural, comprehension, and access problems, and the writers can then revise the manual to alleviate those problems. Using Protocol-Aided Revision, the CDC has developed a series of manuals that directly address the novice user (the primary audience) while systematically patterning information for the occasional and expert user (the secondary audiences) [1].

Our research has shown that a key to designing usable manuals lies in:

1. Establishing clear content patterns.
    - Organizational structure is predictable.
    - Procedural information is distinguished from background and explanatory information.
    - Headings provide organizational cues and divide the content into manageable chunks.
    - Periodic summaries are provided.
    - Textual pointers help users find relevant material.
2. Maintaining consistent visual patterns.
    - Page layout reflects the structure of the information.
    - Page headings display current topic and page number.
    - Type faces consistently distinguish text, user actions, and computer responses.
    - Levels of headings reflect the levels of information.
3. Testing the manual for usability with PAR.
    - Procedures are accurately and clearly presented.
    - Needed information can be located quickly.
    - Manual can be read by the intended audiences.
    - Manual can be used by the intended audiences.
4. Making access to information easy for all audiences.
    - Include several accessing methods--simple survey of headings, Table of Contents, and Index.
    - Display a hierarchy of relationships in access lists.
    - Use both technical terminology and colloquial language to list information.

1.1 Designing Manuals for Novice Users

The CDC structures a manual for the purpose and primary audience identified by the sponsoring agency [5]. When, for example, the University wanted a manual to introduce new students (primarily freshmen) to the Computation Center's TOPS-20 operating system, the CDC structured the manual primarily for the novice.

Features of the TOPS-20 manuals that make them particularly usable by novices are:

- **Clear Content Patterns**

The organizational plan is a series of tutorials that move from "getting started" activities (such as logging in) to using the mail system and the text formatter.

The tutorials are organized according to order of use; within the tutorials the information is presented from simple to complex. Further, long tutorials are divided into manageable chunks.

Procedural instructions are presented in an Action/Response/Help format. The Actions make clear what the user should do; the Responses display how the system responds and thus provide reinforcement and encouragement; the Helps explain what to do if a different response appears.

Descriptive headings preview the information that follows. (Headings include both commands and scenarios for use by knowledgeable and naive alike.) [4]

The summaries help novices review a procedure and monitor their learning.

- **Consistent Visual Patterns**

A grid is used for the Action/Response/Help format to help the naive user keep his/her place in the sequence and bypass irrelevant information (such as Help when the correct response appears), and to separate procedural information from the text of the manual.

User actions are shown in italics; computer responses are shown in "typewriter" font (which is similar to the style of letters displayed on the terminal screen); special keys on the keyboard are shown in small caps.

- **Ease of Access**

The Table of Contents is arranged hierarchically to display the relative importance of topics. Further, each tutorial has a detailed Table of Contents constructed from the headings in the text.

The Index is arranged hierarchically to guide the eyes to the more important topics.

In both the Table of Contents and Index terms are linked with scenarios of the concepts or actions they convey [4]. Further, the Index includes terms, scenarios, and colloquial references.

1.2 Adapting a Novice Manual for Occasional and Expert Users

Because a secondary audience often uses a manual, the CDC uses several strategies to adapt the manual for those users. In the case of the TOPS-20 manual for novices, the secondary audiences were:

1. new faculty and graduate students familiar with computers but unfamiliar with TOPS-20, and
2. the original novices after several months of using the system.

These secondary audiences (the expert and occasional user) need an overview of the system and/or answers to particular questions. Of course, a number of the general strategies discussed above benefit secondary audiences as well. For example, using headings with both command names and scenarios and including summaries at the end of each tutorial allow the occasional and expert user to find relevant information and bypass detailed discussion and practice exercises.

The key to adapting manuals for secondary audiences lies in establishing ways to access information easily.

2 Designing Flexible Information Access

For most technical writers, designing a flexible pattern for information access in a computer manual requires applying their training in sectioning documents, preparing Tables of Contents, and organizing an Index to the problem of reaching many audiences. "Flexible" is a key word though. Traditionally, users of technical documents have known technical terminology and thus were able to access information through terms. But the new computer users will not be uniformly familiar with terms, even when they understand the processes or know what they want to find out.

Considering how people "look up" the information in a manual is important to designing flexible access patterns. There are three commonly used (but not mutually exclusive) strategies:

1. Scan the text, trying to spot the information you want.
2. If the information is likely to be a major topic, check the Table of Contents.
3. If the information is likely to be a detail or is likely referenced in several sections of the text, or if the first two methods fail, check the Index.

The first strategy--the random access method--is most often successful when you're very familiar with the particular text or topic. While it is not very efficient, the flip-through method can be aided by the kind of general visual strategies discussed above. Consistent page layout, page headings, heading patterns and use of type to highlight provide help for the inveterate scanner.

The second strategy--use of the Table of Contents--is the preferred method for most users when they are trying to understand major topics. Reading the Table of Contents helps them locate the primary discussion of a topic and lets them gain a sense of the manual's global organization. If what they're searching for is not in the first section selected, users can choose another section to scan based on their understanding of the global pattern. After several attempts, however, such a strategy becomes less efficient than searching the Index.

The third strategy--use of the Index--is the preferred method when the information is a detail (e.g., how to change the linewidth in a text-formatting program) or when users want all references to a topic they expect will be discussed frequently (e.g., uses of the Meta function key).

To design flexible access patterns, then, we need to:

1. Realize that many new users are likely to think of procedures and concepts in non-technical terms (not to mention expert users who have a different terminology), and
2. Keep the "look up" patterns in mind.

2.1 Tables of Contents for Many Users

Highlighting global organization patterns and sectioning documents has traditionally been a strength of technical writing. Writers effectively use the Table of Contents to display the skeletal structure of a document. Typically these sections have had technical, term-based headings though--headings that are appropriate for professionals but less accessible to mixed audiences.

We suggest two additions to manuals targeted to many types of users:

1. Add section-specific Tables of Contents for the major topics addressed in the manual (e.g., TOPS has an introduction and six tutorials. With the general Table of Contents, there are 8 Tables of Contents altogether). This will allow a more detailed outline of the manual to be presented in manageable chunks.

2. Construct Term + Scenario headings for the sections and Tables of Contents. An entry like "CTRL-U -- Deleting Text at the Executive Level" alerts experts who are new to this terminology as well as novice users about how the command functions.

An Example of the TOPS-20 Transformation of the EMACS Manual

The excerpt below comes from the original EMACS manual's Table of Contents [6]. It is written for other computer professionals who may be interested in modifying the editor.

3. Basic Editing Commands	15
3.1 Inserting Text	15
3.2 Moving the Cursor	16
3.3 Erasing Text	16
3.4 Files	16
3.5 Help	17
3.6 Using Blank Lines Can Make Editing Faster	17

With the exception of "Files," this section of the Table of Contents is attempting to follow a scenario approach to headings. But the text may mislead the novice because it does not use both term and scenario and ultimately looks more approachable than it is: "Inserting text," for example, is about visiting files and moving chunks of text between files, a more advanced maneuver than the heading suggests.

When writers of the TOPS-20 manual transformed the "Basics" section of EMACS, they used scenario headings alone because the audience was users new to EMACS commands.

1. Introduction	C-1
2. Getting Into EMACS	C-2
3. Saving Your Work	C-4
4. Leaving EMACS	C-5
5. Editing With EMACS	C-6
Moving the cursor	C-7
Making changes	C-11
6. Emergency Procedures	C-14
7. EMACS Summary	C-16

2.2 Indexes for Many Users

Several sources offer strategies for constructing Indexes: book publishers, technical style manuals, and libraries. Book publishers typically direct their authors with the primary instruction, "Underline the terms, names, and concepts in the text that you want indexed." Technical style manuals typically recommend the use of index cards in compiling an Index; they stress that the page references in the Index should point to the most important handling of topics, and the wording of index entries should be based on the widely accepted principal word [2].

Understandably, libraries offer the most systematic advice on index construction. Textbooks on the subject present elaborate guidelines for determining both content and arrangement. In terms of content, the guidelines typically state that an Index should be: complete (including instructions about how to use it); specific (one entry followed by a 2 or 3-line string of page references indicates a need for sub-categories); relevant; accurate; and consistent (alphabetization, use of punctuation, format, and type faces). [3]

Library science also stresses that Indexes should meet the needs of its users. However, librarians readily admit that "little is understood about the needs of the users in terms of the information conveyed by the documents and the effects of that information on the user once that document is read . . . If these questions could be addressed, then indexing quality would improve rather dramatically [3]."

In essence, all these sources of index advice view the problem as one of ellucidating the terms in the text. Their goals are involved with making the information accessible to the professional user--the person familiar with the technical topics discussed. In most technical writing tasks this term-based method is entirely appropriate, but in computer manuals aimed at a variety of audiences, new strategies are needed as well. The traditional term-based method for constructing an Index, while it is an important first step, does not guarantee that the Index will meet the needs of all types of users because it does not take into account the users' representation, or mental model, of the system being documented.

In the remainder of this paper we present additional considerations important to designing flexible Indexes to computer manuals: questions about the uses of the manual, the users of the manual, and the information to be accessed. These questions attempt to capture how users of the manual will represent the information in the manual. We do not think these questions are sufficient. Ideally a flexibly designed Index should be developed using:

1. A traditional term-based set of entries.

2. Additional entries based on the uses, users, and information to be accessed.

3. A user test of the Index to detect shortcomings and to validate usability.

2.3 Questions helpful to Constructing Flexible Indexes

What is the purpose of the system being documented?

Categorize the uses according to:

- Complexity of the information conveyed
- Uniqueness of the system
- Projected frequency of use

Who is the audience for the manual?

Categorize the audience along various dimensions:

- Level of knowledge about computers (e.g., novice, literate, expert)
- Level of knowledge about system's purpose (e.g., accountants vs. clerical staff using budget forecasting system)
- Frequency of use (e.g., infrequent, occasional, heavy)

How might the information be characterized?

Categorize the information:

- Number of Technical Terms
- Number of New Terms
- Analogies of New Terms to Existing Systems
- Colloquial and Metaphorical Names

An Example from the TOPS-20 Index

Suppose a TOPS-20 user wants to specify a particular printer for output. How would the person find that information using the Index? We've reproduced entries from the TOPS-20 Index that pertain to the "printing files" question.

Files
    appending D-28
    copying D-16
    creating D-7
    definition of D-1
    deleting D-24
    editing D-8
    expunging D-24
    information about E-3
    input D-4, F-1
    naming D-1
    output D-5
    printing D-9
    renaming D-23
    restoring D-26
    retrieving D-27
    saving offline D-27
    typing D-15
    undeleting D-26

Printing files
    cancelling a print request D-14
    finding out if your printout is ready D-12
    sections of a file D-13
    switches D-9, D-13

A person experienced with computers may check under "files," then "files-printing," then "printing files-switches," and find the information on D-13 fairly quickly. But the person who does not think "print files" will probably only check "printers," find "printing files" and investigate that option because it is close. The novice user likely will not quickly identify "switches" as an important word, so while the information is available, for the inexperienced user, it is not highlighted. While the Index includes technical terms for the expert and has obviously taken the novice into account by using actions/activities in addition to terms, it needs further refinement. To highlight the information needed for the novice, another listing for "printers" should be added.

This example illustrates the need for testing. The writers constructed a term-based Index and then used the additional considerations to make the Index accessible to novices and experts. But, as in many technical writing situations, they did not have time to thoroughly test the Index by having users try to locate answers to typical questions. A user test of the Index may have shown the writers that, for example, novices would look to the simplest term for the information they need--"printers"--rather than a more sophisticated terminology of "files" or "printing-switches."

Until we have more complete models of how different user groups access information, we need to run user tests on Indexes. Of course, these user tests will also help us model the variety of users.

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Techniques for Handling Special Applications

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Technical communicators share a common goal—ensuring the intended message gets to the user. The Techniques for Handling Special Applications panel discusses three approaches to achieving this goal—a technique that technical writers can use to describe an electronic circuit; practical methods for planners and writers to analyze their audiences and write user-friendly documentation; and solutions to the terminology problem in the computer industry.

In his paper, "So You Want to Describe an Electronic Circuit," Bennie Grezlik presents an impressionistic introduction to describing circuits. To assist the technician in decoding the electronic circuit diagram, Grezlik suggests a straightforward approach, referencing each important point in a circuit diagram in the text, following the information flow pattern of the diagram, and breaking up a complex circuit diagram into manageable pieces and presenting them one at a time.

William Horton admonishes us to "Look Me in the Eye When You Write That." His paper, subtitled "How To Put the User in User's Guides," describes how creators of user's guides can ensure they meet the user's needs. Horton discusses the pros and cons of various methods of gathering information—market surveys, questionnaires, telephone surveys, and user visits. He stresses the importance of using terminology preferred by the user, studying what it is the user likes in other user's manuals, and having the potential user try out the manual with the product (if it is available) before publication.

Mary E. Olsen addresses several solutions to terminology problems in her paper, "Terminology in the Computer Industry: Wading Through the Slough of Despond." To eliminate problems with terms that are unnecessary, unclear, and sometimes in direct conflict with each other, Olsen describes a two-pronged approach—one for current problems and another for impending terminology problems. Solutions discussed include establishing a dictionary that documents the history and usage restrictions of words and creating a list of synonyms cross referencing terms to various computer systems. To solve potential future problems, she describes the involvement of technical communicators with programming groups while they are designing and developing new products and the terminology to go with the product.

So You Want to Describe an Electronic Circuit

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ABSTRACT

Describing electronic circuits for engineers and technicians has many inherent problems and idiosyncrasies. The first consideration is that the audience expects a particular type of descriptive technique. The technical writer who has been successful in other areas may find this technique elusive.

But this technique is not arbitrary; it was developed in the early days of radio, years before most of us were born, to fill the particular needs of the people who kept Lux Theater and Amos an' Andy on the air. A half dozen generations of technical writers and electronic technology have matured since then, yet a circuit is still described in the same general way. This traditional technique relies on the following concepts:

>> *The circuit is composed of a number of indivisible units.*

>> *The units of the circuit form a contiguous whole.*

>> *Electrical information known as "waveforms" flows through this circuit, usually from left to right.*

>> *Each unit of the circuit performs a distinct operation on the passing waveform.*

>> *All of the above concepts depend absolutely upon the presentation within the text of a special illustration known as the circuit diagram. The circuit diagram can be presented as a single figure, but it is better to apportion it in a series of bite sized chunks, each with a dollop of text.*

The technique that the technical writer should strive for consists of:

>> *Describing the raw waveform (information) as it enters the circuit at the far left side;*

>> *Following and describing the changes in that waveform as it moves through and is effected by the units of the circuit;*

>> *Summarizing the entire process and describing the end product of the circuit, be it a radio voice, a television picture, or a computer program.*

INTRODUCTION

I won't lie to you about the work of writing circuit descriptions for the technician or engineer. It is hard work. Consider the job to be similar to driving your car through every major city in the country, and then explaining what, how, when, and why each city contributes to the gross national product. Now subtract all the pretty scenery from your journey and you will have the essence of describing circuits.

Nor will I lie to you about the qualifications you need to be successful. The prerequisite, as you might guess, is a strong skill in communication. Beyond that, if you want to describe circuits (or, more probably, if your boss tells you that you are going to describe circuits) and you don't know a transistor from a transformer, you are in trouble.

But your plight is not hopeless. You don't have to burn midnight oil to understand the electronic ground rules, but it helps. You don't have to play the part of a hawk-eyed Product Engineer, but it helps. And you don't have to get interested in how circuits work, but it helps, and you will need all the help you can get.

If you can motivate yourself, if you can learn the ground rules, you are in for a surprise. Describing circuits is fun! Not like the kind of fun you had at Puerto Vallarta last winter, but fun none the less. This paper is no more than an impressionistic introduction to describing circuits, so if you're interested, by all means, investigate further.

MORE THAN A PRETTY PICTURE

The one, indispensible, special illustration which must be included in every circuit description is the circuit diagram. The circuit diagram is a detailed road map of an electronic circuit; its towns and cities are electronic components; its roads are metal thoroughfares of electricity; its highway signs are waveform portraits. The circuit diagram tells a story to the intent listener.

As technical writers, we have been taught that illustrations are an adjunct to the text. In many cases, this is true. But the text of a circuit description is an adjunct to a circuit diagram. This point cannot be overemphasized; if a technician or an engineer has to choose between your circuit diagram and your words (accuracy granted to both), he (or she) will choose the circuit diagram every time. This does not mean that your descriptive words are trivial; on the contrary, your words are very important to the understanding of the equipment. But (sorry), the circuit diagram is paramount.

So, the question is not "How can I render the circuit diagram superfluous with my brilliant description?" for this is impossible, but rather, "How can I help the technician decode this Rosetta Stone of electronics?" You can help several ways:

>> You can describe the circuit in as straightforward a manner as possible.

>> You can ascertain that you are solidly referenced from your text to every important point in the circuit diagram. This is not hard to do because every component in a real life circuit will have its own special symbol on the circuit diagram, and each symbol will have a shorthand code known as a Reference Designation. If you write about components on the circuit diagram without mentioning the Reference Designation, you are courting the reader's confusion and irritation.

>> You can follow the same information flow pattern as the circuit diagram. This will usually be left-to-right, but there are sometimes exceptions and awkward detours.

>> You can break a large circuit diagram into manageable pieces and present one piece at a time.

EYES LEFT

The tradition of describing a circuit diagram from left-to-right probably originated because of the left-to-right reading bias of western culture. The bias to "read" a circuit diagram from top-to-bottom is much less pronounced, but still exists. Circuit diagrams are usually drafted to show processing of the rawest information to the extreme left, and the "finished" waveform, or effect, emerging at the extreme right. (See Figure 1.)

From my own experience as a technician, I can say that the technical writer who ignores this left-to-right reading bias confounds the reader's understanding of the circuit. I recall working frantically with a team of other technicians far into the night to repair a crippled radar set. This was in Iceland in the early sixties, a time of strained relations with the USSR, so we worked with a certain urgency.

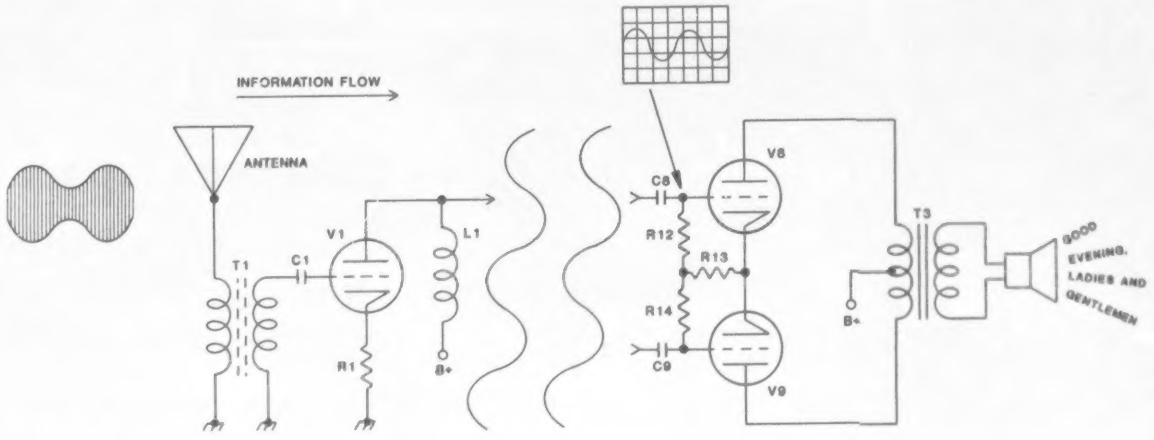

FIGURE 1 EARLY RADIO: THE GOOD OLD DAYS

But we were misled. And because we were misled, a "hole" several hundred miles wide in the defensive radar net of the West was allowed to exist for a dozen nervous hours.

The problem was the circuit description. Each "chunk" of the circuit was explained adequately, but the relationship between the "chunks" was random, as far as we could reconstruct later. But in the heat of trying to understand the description, we unconsciously imposed a left-to-right flow in the description, and we were wrong. So you see, this method (or lack of method) of description does more harm than good.

The Reference Designation (in Figure 1) is the label beside each symbol. Incidentally, the "V" designations in those early days did not stand for "Vacuum Tube," but for "Valve" (electron valve, to be precise). Using a "valve" to control the "flow" of electrons is rich with imagery. Today we have circuit components the size of pencil erasers that contain literally hundreds of thousands of solid-state "valves," so the term is no longer needed. We are poorer for this loss of technical imagery.

The technical writer may make an exception to the left-to-right scheme when describing and presenting auxiliary functions within the circuit, such as power supplies, or start-up networks. The writer should describe these sub-circuits first. In Figure 1, the designation "B+" refers to a power supply circuit not shown. It is entirely appropriate to present separate illustrations on these sub-circuits.

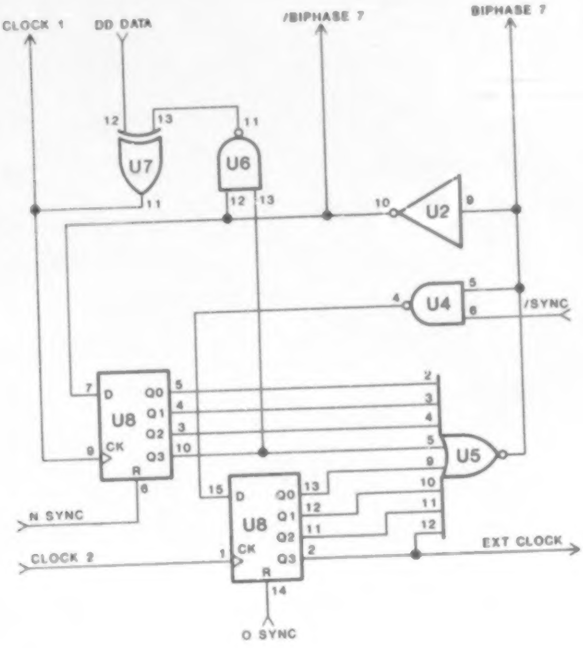

FIGURE 2 DIGITAL LOGIC: OUCH!

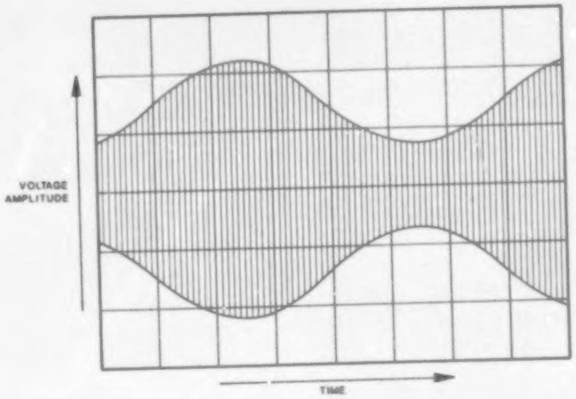

FIGURE 3 MODULATED CARRIER WAVEFORM

HOWEVER...

Now that we have expounded the traditional, we will say that the present trend is straining the left-to-right format. This is because the analogy of circuit components "refining" a passing waveform breaks down under the complexity of modern digital logic circuits; waveforms lose their charm. Binary numbers are the meat and "signatures" are the potatoes of these circuits. (See Figure 2.) The hapless technical writer will find inputs and outputs at every compass point of the diagram.

Some technocrats argue that written descriptions of modern circuits are becoming less important to technicians because of the growing prevalence of computerized self-testing features. The counter argument is that some group, at some level, has a need to understand how the circuit works.

There are other methods of analyzing and describing modern circuits. There is Signature Analysis and Wiring Lists, for instance. These methods lend themselves very well to computerized testing. But if your audience is some one who has to understand how the circuit works (such as the novice technician), your best bet is to explain it with the classical left-to-right technique. You may also have to redraft that confusing circuit diagram into a left-to-right flow chart.

INFORMATION IN THE RAW

Information, in the guise of waveforms, enters the circuit in a relatively unprocessed form of electrical energy as shown in Figure 3.

Figure 3 is a time-versus-amplitude graph of a modulated radio frequency wave. In this case, "unprocessed" simply means that the waveform is not yet in a form that we wish it to be. Our circuit will take care of that.

Notice the gridwork in Figure 3. This is the metric measurement etchings found on the screen of all standard time-versus-amplitude oscilloscopes. When connected to a circuit, these handy electronic instruments will present waveforms in the same format as Figure 3.

GO WITH THE FLOW

Our premise is that information flows through the circuit from left-to-right. The concept of information flow is a rhetorical convenience, of course. Events transpiring at nearly the speed of light cannot be said to be flowing in human terms. However, the images are helpful.

We say that the waveform flows through electronic units. An electronic unit is any discreet component in the circuit. This may be a resistor, a capacitor, a silicon "chip," or a number of other devices. Each may be thought of as a "black box" with a well defined input and a well defined output. Each unit of electronic circuitry performs an operation on the waveform.

The waveform evolves at each step of the circuit. Sometimes the progress may seem like one step forward and two steps backward, but it takes contortions and hoop jumping to move waveforms in a circuit as well as performers in a circus.

...AND IT COMES OUT HERE

Finally, the journey is over. The technical writer is ready to describe the effect of the circuit, the end result of all that has gone before. This effect may not be a waveform. We suggested radio waves earlier and the end result, of course, would be the friendly voice of your announcer.

This is the point at which the technical writer should summarize the actions of the circuit and emphasize that those actions were designed with the end result in mind. This summarization should offer a hint of the Big Picture, the overall purpose of the electronic equipment. But the summary need not paint a picture with overly broad strokes because, if the equipment is of any consequence, there should exist concurrently a General Description and a Theory of Operation. In all likelihood, if you are writing the Circuit Description, then you will have written these other documents. But that's another story.

Look Me in the Eye When You Write That
How to Put the User in User's Guides

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To write user's guides that truly serve the needs of the users, you must put the user in user's guides. *To do this you must first know who the users are. Through phone calls and visits to users, form a concrete view of the users and their needs. Get users to say what the user's guide must do for them and to supply you with models of user's guides to emulate. Ensure that the writer assigned to develop the user's guide identifies with the users and keeps them clearly in mind throughout the project. Expose users to the product and let their naive questions guide the content and structure of the user's guide. When a draft is ready, have users test it. And later, after the manual has been in use, incorporate the suggestions of actual users.*

Welcome to the USER FRIENDLY decade. It seems everything you buy these days is labeled "user friendly" (or "user-oriented" or "user-centered", etc.) This phenomenon is authenticated by no less an authority on current social and cultural trends than *Psychology Today*, which devoted the entire December 1983 issue to this subject. In the field of computers this obsession has reached the level of high art (or low religion). The phrase *user friendly* is to computers what *new and improved* is to laundry soap and toilet tissue. Ubiquitous in the advertising, user friendliness is now proclaimed in every subcomponent, from the megabyte disk drive to the kilopage user's guide. But to what extent are these user's guides user friendly? And, how can we who create them ensure they really meet the needs of the people who read them? By putting the *user* into the *user's* guide, that's how.

Find out who the users are.

Every course and book in technical writing zealously admonishes the writer: "Know thy user!" After a few repetitions for ritual's sake, most then move on to easier topics like split infinitives and dangling participles. The poor writer is left with two cents worth of good advice and no clear idea of how to proceed. Far too many writers do

proceed, though, to write for the only user they know: themselves. Computer programmers write for computer programmers, English literature majors write for other English literature majors—and another forest of so-called user's guides go into the trash can.

Knowing the user is not impossible. It's not easy, but it's not impossible. It takes the labors of Hercules and the deductive genius of Sherlock Holmes. If, as you said in the job interview, you like working with people, it can be deeply satisfying.

The first step is overcoming the objection that there are no users to know yet. If you're preparing instructions for a product as it's being developed, acceptable substitutes abound. Consider *potential* users. The product is being developed for use by someone. Who? And how about people using competing or analogous products? Just because your computer is going to be yellow doesn't mean you can't learn a thing or two from folks using an orange or a chartreuse computer. If your product is so new, so revolutionary, so unique that there's never been anything like it; you can still find people whose background, experience, and job duties match those of the people you expect to use your product. Seek them out.

Go beyond statistics.

I don't mean to add a sour note to the harmonious chorus of advice that recommends statistical and demographic analysis of the user population. Combined with the other techniques listed below questionnaires and marketing surveys can provide useful background information, especially surveys that reveal the attitudes and motivations of actual users.[1] But we should avoid the trap of relying solely on readily available or easily obtained statistical information.

The danger is that such a statistical approach can do little more than sketch an *abstract* picture of a *stereotypical* user. But what writers need is a *concrete* image of a *real* human being—a flesh and blood, living, breathing user. A six-foot stack of questionnaires can't replace one handshake or questioning glance from a real user.

Conduct phone survey.

From the marketing survey, or from your questionnaires, you have obtained the phone numbers of some users. Well, what are you waiting for? Call them. With a phone survey you can do things impossible with a questionnaire. You can ask open ended questions, like, "What do you do in your job?" or "How do you feel about having to use this new product?" or "How does your current system work?" Most people don't mind talking about their feelings, desires, and interests. At least they're more willing to *talk* about them than to *write* about them. And if they don't answer the way you expected, you can always ask follow-up questions. From the pitch and tone and timbre of their voices you can gauge impatience, interest, and confusion. And you can adjust your strategy, rephrasing confusing questions and persisting on important points.

Visit users.

Don't just reach out and touch someone by phone. Visit them where they work. There is no substitute for observing first hand the people who will use the product, where they will use it, and what they will do with it.

When you first propose a visit, you may be greeted with suspicion. Is this a sales call? Are you a spy from a competing company? What's in it for me? Plead. Cajole. Offer to serve coffee and sharpen pencils. Promise whatever it takes to get in the door.

When you get there, learn and record everything you can. Don't assume you'll remember it when you get back to your office. Take along a camera and tape recorder. Get pictures and tapes of the people you meet. (I'll tell you what to do with them later.) Also get pictures of the user's work area and tapes of background noise. Pay close attention to working conditions. Is the work area spacious or cramped, tidy or dingy, bright and cheerful or dark and drab? Is the work well organized and routine, or is it chaotic with crisis on top of crisis? Be sure to ask users what they'll use your product to do. And get samples of how they do things now.

When you interview users, try to do it without their supervisors present. Assure them that their comments are confidential. Often I've found that a user interviewed with his supervisor present repeats his supervisor's opinion; interviewed alone, he give his own opinion.

Let users set objectives and standards.

By now, you know some users. You've shaken their hands, looked into their eyes, and perhaps shared a cup of coffee. You know who the document has to satisfy. But what will it take to satisfy them? Well, ask them: "What will you do with the user's guide?" "What do you expect it to do for you?"

Now, write your objectives in your users' own words. No user would ever say: "After completing this manual I want to be able to list the 12 major engine faults that can be detected by the Diagnostomatic automotive troubleshooter." He wouldn't say that because he knows (and so do you by this point) that he doesn't get paid to *list* things. His job is to find out what's wrong with cars. He might phrase an objective like this: "After reading the user's guide, I should be able to find the 12 most common engine problems in 10 minutes or less." If the user and the buyer agree that's what they want, you've got a clear, solid performance objective to shoot for.

But don't stop there. Ask the user if he has any user's guides he considers user friendly. Chances are he'll reach into his desk drawer and sheepishly pull out some dog-eared sheets of paper. They may be ragged, they may be ungrammatical, they may even be printed on an old ditto machine; but if they work, you'd better spend some time studying them. You'd better figure out why they work and imitate the features that make them work.

Identify with the user when you write.

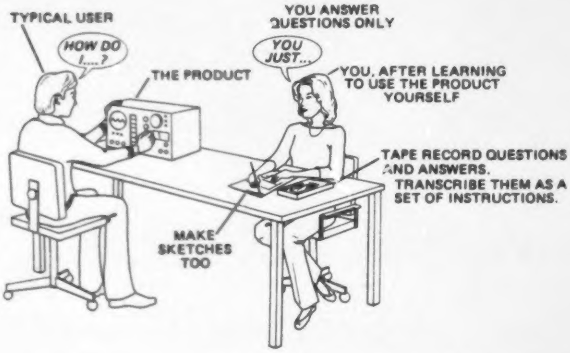
Remember tnose pictures I told you to take of users? Tack them up on the wall in front of your desk to remind you that you are writing for real, flesh and blood people. Write for these people, not some porcelain statue entitled THE USER. I used to put a caption under these pictures. It read, "When you write that, look me in the eye!" Though whimsical, it never let me forget who I really worked for. And whenever I had to make a decision as to what to include or what to leave out, or how to describe something, these pictures never failed to clear my mind and steady my hand.

Another way to maintain sympathy with the user, while developing the technical knowledge you need to write the user's guide, is to actually use the product. Explore every part of the product. Try using it to do the things it's designed for. Then, try thinking up new uses for it. Relish the frustration of learning to use it. Remember every stumbling block, every petty annoyance, every little triumph. Become a user in body and spirit.

Have users help write the first draft.

Users can be quite helpful in writing the first draft. Sit down with a user and the product. Give the user no written instructions. Have him learn to use the product solely by asking you questions. With your tape recorder running, have him paraphrase your answer to each question. Keep the tape and any sketches you may have made and you'll have a complete first draft *written in the user's own words.*[2]

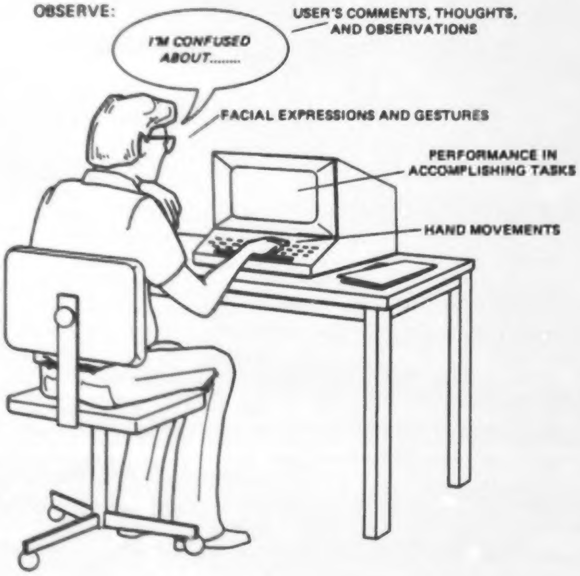
USER LEARNS BY ASKING QUESTIONS


TYPICAL USER
HOW DO I....?
THE PRODUCT
YOU ANSWER QUESTIONS ONLY
YOU JUST...
YOU, AFTER LEARNING TO USE THE PRODUCT YOURSELF
TAPE RECORD QUESTIONS AND ANSWERS. TRANSCRIBE THEM AS A SET OF INSTRUCTIONS.
MAKE SKETCHES TOO

But what if the product is still under development and a prototype is not yet available? Get the product designer to sit in and simulate the product. The user says what action he would take and the product designer says how the product would respond. Back and forth they go: the user learning how to use the product, you learning how to write the instructions, and the product designer learning how to improve the product.

Let users test the draft.

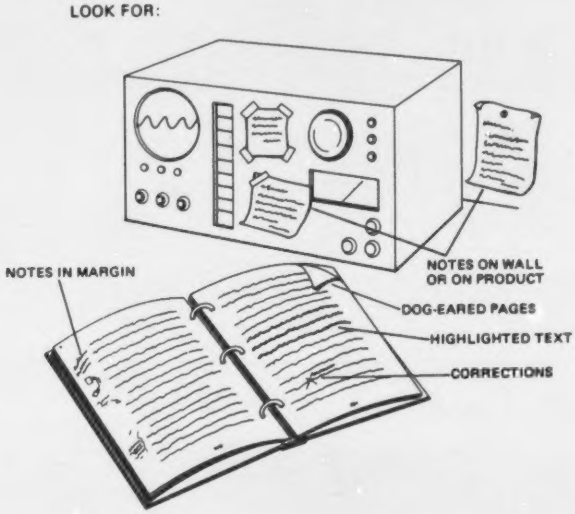
Once you have your first draft typed with rough sketches in place, have users test it. Note their behavior carefully.[3] Notice when they wrinkle their brows or shrug their shoulders. Watch for hands searching for buttons and switches. Ask them to think aloud as they use the product. (This thinking-aloud technique is called *protocol analysis.*[4]) Note where users stumble or just slow down. But don't be too eager to offer help, let the user solve the problem in his own way. Then get him to describe the problem *in his own words.*


OBSERVE:
USER'S COMMENTS, THOUGHTS, AND OBSERVATIONS
I'M CONFUSED ABOUT........
FACIAL EXPRESSIONS AND GESTURES
PERFORMANCE IN ACCOMPLISHING TASKS
HAND MOVEMENTS

As an alternative, let two users test the manual together, while you carefully observe. Note the questions they ask one another and the answers they give. Notice whether they try to answer questions by experimenting with the product or by reading the manual.

Include revisions by users

Even after you've published the manual you can still benefit from the experience of users. When you are ready to revise the manual, visit actual users. Look at their manuals. Note the dog-eared pages, the notes scribbled in the margins, and the corrections written between the lines. Also be on the lookout for notes tacked on the wall or taped to the front of the product. Be open minded and ready to say, "Why didn't I think of that?"



Who knows, with an open mind and hard work perhaps you'll produce a user's guide that users will actually use. And someday when someone asks them for an example of a user's guide they consider user-friendly, they'll reach into their desk drawer and pull out the one you wrote.

References

1 For help designing questionnaires, see *Statistical Methods for Behavioral Science Research* by L. A. Marascuilo.

2 See "User-Testing Directions" by John Juskevice, in the *Proceedings* of the 29th ITCC.

3 For examples, see "Building a User'Defined Interface" by Dennis Wixon *et al* and "Playback: a Method of Evaluating the Usability of Software and its Documentation" by Alan Neal and Roger Simons, both papers in the *Proceedings of CHI'83 Human Factors in Computing Systems,* published by the Association for Computing Machinery.

4 For an extensive example of protocol analysis, see *Human Problem Solving* by A. Newell and H. A. Simon.

Terminology in the Computer Industry: Wading through the Slough of Despond

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ABSTRACT

Computer terminology is flooded with words that are unnecessary, unclear, and sometimes directly in conflict with one another. To address the problem, anyone working with computer terminology faces a two-fold task: (1) creating some order from the existing chaos and (2) diminishing the chaos that rolls toward us from the future.

Our Rochester publications group has adopted certain measures to deal with current and impending terminology problems. We have compiled a dictionary that documents the history and usage restrictions of our words. Also, we have drawn up a list of synonyms that provide a cross-reference to the various terms used for our various computer systems. Finally, we are instituting several programs designed to involve us in the problem of terminology at a time when it is often still manageable: when the programming and marketing groups who are helping to design and develop the future of data processing software are also cheerfully inventing the terminology to go with it.

INTRODUCTION

Surveying the Problem

To most of us who work with data processing documentation, it is common knowledge that the vocabulary of the computer–new words raining down onto a sea of other words–is a muddy and muddled mess. Various popular articles on the subject of computerese have increased the public's awareness as well as our own, which is fortunate: the more visible the problem, the more effectively we can confront it.

The mess, in brief, looks as follows.

Reproduction Among the Noun Classes

On an industry-wide scale, computer-related terms have proliferated with little regard for linguistic decency. The typical English-speaking computer novice sitting down in front of a computer is now accustomed to hearing its display screen called, variously, a *CRT* or *cathode ray tube*, *screen*, *display*, *tube*, *terminal*, *data station*, *work station*, *display device*, *panel*, or almost any combination of these terms. Programming commands may be referred to as *instructions*, *op codes*, *procedure commands*, *I/O (input/output) commands*, *statements*; they may be *fetched*, *called*, *got*, *loaded*, *evoked*, or *invoked*.

The computer's data storage area may be called *main storage*, *primary storage*, *real storage*, *core storage*, *core*, *control storage*, *internal storage*, or *memory*. The flexible disks may be called *diskettes*, *floppy disks*, or *peripherals*, any of which can be *saved*, *backed up*, or *duplicated* (on a *spare copy*, *backup copy*, or *duplicate copy*).

A computer connected to another computer may have *communications*, *data communications*, *data transmission*, *telecommunications*, or *teleprocessing*, depending on whose vocabulary the user has fallen victim to.

Indeed, only with luck will the vocabulary remain even reasonably consistent within the documentation; not infrequently several terms are used interchangeably from chapter to chapter or even from page to page and sentence to sentence. One publication, for instance, has a chapter on *Interval Timer* that opens with a page that refers to the interval timer as a *feature*, a *three-byte binary counter*, a *timer*, a *time-of-day clock*, an *interval timer counter*, an *attachment*, and a *timer attachment*.

Revolting Parts of Speech

The problem is not merely that new terms are being spawned so enthusiastically; with equal abandon such words are violating certain time-honored laws of the language. Consider the case of the byte (usually defined as the sequence of eight adjacent binary digits that the computer operates on as a unit).

In some computing systems, however, a byte includes not only the eight adjacent digits (called bits) but also an extra bit called a parity bit. (One hopes that the movement underway to try to replace the term *byte* with the term *octet* will die a natural death.) Finally, the beleaguered novice making the perfectly normal assumption that a megabyte equals 1,000,000 bytes is in for yet another disillusionment: a megabyte actually consists of 1,048,576 bytes. (A kilobyte, incidentally, has 1024 bytes.)

Another linguistic assumption–that nouns are nouns and verbs are verbs–in recent years has diminished from an expectation into wishful thinking, and the computer industry reflects this diminution. By now most of us are probably resigned to seeing that stolid noun *impact* parading around as a verb. And many of us are in the throes of reconciling ourselves to the evolution of *input* and *output*, which have barely had a chance to establish their credentials as nouns before people have started dressing them up like verbs: "Data is inputted (or 'input,' sometimes) to the field," or "The file is output to the printer." We may even be only mildly distressed to learn that the principles of *flowcharting* are taught in some classes. But can we really acquit whichever data processing shop advertised its services for people wishing to *remote* their terminals?

Nearly as often as once stable and trustworthy nouns are cavorting about like verbs, the reverse occurs: a growing number of misguided verbs are trying to take root and establish themselves as respectable nouns and adjectives. Thus we find our documentation referring to *the apply*, *the reapply*, *the save* and *the restore*, *the install* and *the reinstall*, and so on. And we have a *notify message* and a *notify object*, a *commit cycle* and a *commit identifier*, a *select/omit field* and *select/omit level specifications*. (Apparently these recreants seek safety in numbers, as they tend to stake out their claims in pairs.)

While the list could go on, and on, and on, it must be acknowledged that many such terms never find their way onto the printed page. Furthermore, those that do are generally preceded by some in-house skirmishes, with the terminology coordinators defending the heritage and logic of the language and the programming groups pointing to what's already been accepted in the rest of the industry or implanted in the innards of a particular computing system (such as the coding that makes up the displays and messages that appear on the screen).

Other computerese quirks happen by virtue of the simple if depressing fact that most of us, if we hear something said a particular way often enough for a long enough period of time, will gradually come to accept it. That innocent-seeming preposition *to*, for example, has been overrunning other prepositions at an alarming rate and has acquired enough legitimacy in many circles to have found its way into our publications. Thus we find data *copied to diskette* or *copied to tape*, or *written to a file*. (What is happening here, according to an insightful former colleague, is that we are unwittingly abbreviating the process: the data is actually copied or written and then sent to its destination.) Unfortunately, when a publications group receives all its written and verbal source material in this truncated form, it eventually tends to accept and ultimately adopt that form. Those few of us who resist the trend merely cause inconsistency in the library of publications, with one or two books using the language differently from the majority.

Confronting the Problem

Given this predicament, the terminology representatives in our publications group have a challenging job. Their response has been to attack the problem of a billowing language on two major fronts.

1. To encourage writers to use existing terms accurately and consistently, the terminology people have compiled certain glossaries, dictionaries, and word lists that record and define the words we already have. These include **System Glossaries**, the **Rochester Dictionary**, and the **Rochester Synonym List**.

2. In an effort to influence language while it is being created by the development groups creating the computers, terminology representatives are becoming involved in the development process. The subject of terminology has become a part of the evaluation and approval process for the systems themselves: the terminology people review the programming specifications of new products, work with the developers of the specs to resolve questions and potential areas of conflict, and attend various meetings that lead to the establishment of these products, after which they draw up definitions of terms that they and the product developer agree on.

The first stratagem has been underway for a number of years. The second is more recent. It requires considerable cooperation from the people in the product development lab and is coming about because the industry itself is finally realizing that plain English is integral to how well the user of a computing system will understand it. It is a welcome realization.

DISCUSSION

Channeling the Flood Around Us

The terminology problem exists not merely on an industry-wide scale, or even a corporate scale. It exists in the thirty-foot hallway that currently houses the System/36 writers and the System/38 writers.

System Glossaries

Each computer system has terms that are peculiar to it, undoubtedly because its inventors become convinced that it is unlike any computer that preceded it and thus needs a vocabulary unlike any vocabulary that preceded it. System/38, for example, which in some ways actually *was* unlike its predecessors, developed its own body of words. Its *work station* includes a printer as well as a *display station*, although the terms are sometimes used interchangeably. System/38 documentation refers to *alphameric* rather than *alphanumeric* data, and to a *control unit* rather than a *controller*. Its operating system is called the Control Program Facility, in contrast to the System Support Program of the system that preceded it.

To address this situation, each Rochester-based computer system has its own glossary that is born and that grows along with it. The writer responsible for the glossary tries to see that its terms are clear and accurate and consistent across the system library. This objective will be discussed in more detail in relation to the system terminology representative's role in the development process.

Rochester Dictionary

Terms that are first documented in a System Glossary are later incorporated in the Rochester Dictionary. This hefty book, first drawn up in 1977, documents the spelling, definitions, and usage restrictions of terms used in Rochester-based computer systems. A writer can thus consult the dictionary for the correct spelling of *canceled* and find the following notes:

cancel

Alternative: cncl

Definition: To end the current job abnormally.

Restrictions: Spell the past participle
as *canceled*. Spell the
present participle as *canceling*.
Use *cncl* only in line
names; define cncl in the glossary.

Similarly, an editor who sees the terms *key* and *switch* being used interchangeably in a setup manual can check the Rochester Dictionary to ascertain not only the appropriate noun in that context but also the verb that should accompany it:

switch (See also *operator control.*)

Alternative: sw

Definitions: 1. The generic term for a mechanism on a control panel that must be pressed or set to be activated. This includes center-off toggle switches, key switches, momentary switches, rocker switches, rotary switches, toggle switches, and touch switches.
2. (ANSI) (ISO) In a computer program, a parameter that controls branching and is bound prior to the branch point being reached.

Restrictions: Use *sw* only in line names; define sw in the glossary. Do not confuse *switch* with the generic term *key*. A switch is on a control panel and a key is on a keyboard.

Use the verb *press* with key switches, momentary switches, and touch switches; for example: Press the Start switch. Use the verb *set* with center-off toggle switches, rocker switches, rotary switches, and toggle switches; for example: Set the Status switch to the Normal position.

For a key switch that is used both as a key switch and as a light, use *switch* as the generic term for when it is used as a key switch and use *light* for when it is used as a light.

But if this situation arises when the editor is working on an operator's guide, the Rochester Dictionary will recommend *key* as the correct term:

key (See also *character key, command function key, function key, make/break key, operator control*, and *typamatic key.*)

Definitions: 1. The generic term for a mechanism on a keyboard that must be pressed to be activated; for example: on the 5251 Display Station, the Cmd key and the Shift key. 2. An implement for operating a lock or a tool; for example: a Keylock or a CE key. 3. The identification field in a record. 4. (ANSI) (ISO) One or more characters, within a set of data, that contain information about the set, including its identification.

Restrictions: Do not confuse *key* with the generic term *switch*. A key is on a keyboard and a switch is on a control panel.

Use the verb *press* with keys; for example: Press the Cmd key.

Use the phrase "press and hold down" when a key must be continuously pressed; for example: Press and hold down the Shift key.

The Rochester Dictionary also points out trademark restrictions. For example, when the term *VM* was to go into the System/38 Glossary, the editor checked the Rochester Dictionary, which explained why that wasn't feasible:

VM

Restrictions: Do not use *VM* as the acronym for the *IBM Virtual Machine Facility/370*; spell out the term. If an acronym must be used, use *VM/370*.

Explanation: In October 1976, the Corporate Terminology Representative issued a memo stating that *VM* is a registered trademark of another business in Europe.

Like most documentation pertaining to computers, the Rochester Dictionary needs to be current. Therefore it is updated regularly by our site terminology coordinator in the editing department. Its distribution is wide; copies are sent to the secretaries in Rochester's correspondence centers, to IBM translation centers abroad, and to a multitude of IBM locations in between.

Our system glossaries and Rochester Dictionary are thus invaluable tools for us to ensure that we are using the right terms for the computer system we're working on. But what about that computer neonate approaching our set of manuals inexperienced with computerese in general and unversed in our language in particular?

Rochester Synonym List

Our Synonym List is another sizable document that was created in response to the swelling river of computerese. In this case our goal is to help the person seated in front of that exciting new computer adjust as painlessly as possible to the exciting new vocabulary that comes with it. We recognized that this person is apt to need some kind of cross-reference from old terms to new terms.

What the Synonym List resembles more than anything else is the back section of a thesaurus–a network of similar terms that cross-reference one another:

- buffer
  - I/O area
  - I/O controller
  - input area
  - input block
  - register
  - temporary data storage
- button
  - key
  - lever
  - operator control
  - switch
- buzzer
  - alarm
  - audible alarm
  - bell
  - chime
  - tone

Our writers will be using the Synonym List in developing and updating their indexes in the following general way.

Imagine the writer preparing the index for a new publication, knowing that System/XYZ is put into action with an Off/On button. But the writer doesn't know the background of the readers–being unfamiliar with System/XYZ, they may want to call that button a key or a switch. So in drawing up the index the writer looks up the term *button* in the Synonym List. It lists *key* and *switch* and a few other terms; these become primary entries in the index, with each term simply referring the reader to the *button* entry.

Now imagine our System/XYZ user trying to figure out how to turn on the machine and looking hopefully in the index under any familiar terms (such as *key*). That entry will provide a cross-reference to the System/XYZ term. So our novice has discovered a little about System/XYZ terminology and a little about System/XYZ indexes, and probably the Off/On button of System/XYZ.

Although its original intent was to provide a cross-reference of just IBM Rochester's terms, the Synonym List offers a remarkably comprehensive list of computer terms in general, thus further helping to channel the sea of words that has inundated the industry.

Stemming the Advancing Tide

It's pretty clear that while the measures just described are useful in dealing with an existing problem, they do not pretend to address the problem at its source: newly created or redefined words. This latter situation requires another approach, which we are increasingly adopting in Rochester.

As mentioned, computerese has its source in those abundantly creative people who develop the computers. Their abundantly created words get bounced around in conversation, scribbled on chalkboards, and then printed in initial programming specifications. Before you know it the words are built into the programming of the computer system, at which point they're cast in hard rubber if not concrete and are the very devil to change. All this has a lot to do with the development cycle of these products: they originate in the development lab and only toward the end of the cycle wend their way into the publications. Not surprisingly, the answer to this predicament lies in our getting involved earlier in the development cycle. And because IBM's interest in developing computer systems precedes its interest in publishing books, it is reasonable to expect a publications group to wade into the developer's world rather than wait for the reverse to happen.

In past years we have attended the developers' product review meetings on a sometime basis; now this is happening on a regular basis. Now, when we hear terms that hit our ears like fingernails on a chalkboard, we can raise our concerns while the ideas expressed by these terms are still just ideas. And we are finding that the developers are generally very cooperative *if* we can explain to them why the terms as they use them won't be effective. (There are some awful exceptions to this: there are people who simply neither know nor care much about words and the fact that language and logic are inextricably bound; fortunately these people are not the rule, and when we happen upon them, we usually learn how to work around them.)

Several qualities are required for the successful implementation of this approach during the review meetings. On the one hand we need to be as logical and articulate as possible; on the other we must always be ready to admit what we don't know. Only in this way can we first find out what these terms are trying to convey and later work towards rewording them in some cogent fashion that will satisfy the demands of technical accuracy *and* linguistic clarity. One of the hardest aspects of this approach is to ask for more explanations if the first ones don't make sense. But the result is worth it, in terms and definitions that we–that middle and vital link between the inventors and the users–can understand. (Another advantage, we've discovered, has been finding that we can better write the other manuals to which we're assigned because we've worked toward as complete an understanding as possible of the technical side of the product.)

In working on definitions, we constantly have to go back to the developers to iron out wrinkles that didn't appear during the meeting, and a lot more communication takes place before the glossary goes out for review to the developers, market planners, editors, and other people whose suggestions and comments, conflicting though they often be, are invaluable. Once the reviews are collected, they are sifted and kneaded–and pounded and punched if necessary. One of the pitfalls in the process is that the technical developers know so very much about the terms and often want to include *everything* in the definition. The terminology person must stay on guard to make sure that the glossary definition that goes out to the customer is restricted primarily to what the term is rather than explaining what it does, where it came from, and why we need it. Conversely, concerned as we are that the user be able to read and understand the term as easily as possible, we need to take care that the term not be oversimplified so that its precision is lost.

Usually a delicate balancing act needs to take place between accuracy and understanding. A few years ago, for example, we became engaged in an effort to draw a distinction between the terms *invoke* and *evoke*. After a page or two of fine, fine distinctions being drawn between the two words, we decided that anyone who could understand the difference wouldn't be looking in the Rochester Dictionary for it, and no one else would need to care. In the end we scrapped both words and advised writers to use *call* or *load* instead.

That process of paring down definitions can be frustrating, like lopping off all the extraneous branches from a Christmas tree until the final product fits nowhere so neatly as into the fireplace. We recently had developed some lovely definitions for *paired* and *nonpaired* data, but shortly after they were drawn up in clear, concise, and accurate English, the people over in the development lab suggested we might not need the whole concept.

So what's really needed in developing a good glossary are equal parts of determination and humility: first to ask for explanations as often as necessary and word and reword to work up beautiful definitions, and then to accept the fact that beautifully wrought definitions sometimes turn out to be expendable.

Despite its rigors, we have found that this process, interwoven throughout the development process of the computer system, is the most effective way of managing terminology in the computer industry.

CONCLUSIONS

A good deal of injustice has already been dealt our language by means of the computer industry. Undoubtedly a good deal more will be dealt, for the computer, protean entity that it is, is here to stay. For this very reason, we who are a part of the industry need to maintain vigilance on its evolution. We need good dictionaries to reflect what we have and sound terminology to organize and understand what is coming toward us. After all, we are in a rather special position: we are the ones in the industry who are most aware of the resources and the limitations of language. It is our business to understand where the problem, unchecked, may lead. Monitoring its course, therefore, should be one of our primary concerns. That is to say, we need to take the broadest and longest view of our role and, whenever necessary, to act on what we see–to question, to communicate, to seek to understand, and to work to change that which needs changing.

Whoever has the *ability* to influence the language constructively also has the *responsibility* to do so.

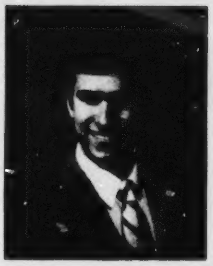
We who are technical communicators have that obligation.

ACKNOWLEDGMENT

This article would never come into existence had it not been for my three years' association with Jeri Aune, who served as Rochester's terminology coordinator while we were both editors. The legal world will surely benefit as much as has the lexicographical one from her incisive logic, sound judgment, and tireless determination to see good sense prevail.

STC Forum

Richard E. Wiegand, Moderator



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The STC Forum is an informal discussion among STC members and other interested persons on subjects germane to the Society and to the field of technical communication. In its 10th year, the Forum provides each person present a chance to express thoughts, ideas, and opinions to Society leaders, and to share concerns on the future of the Society and the profession. Notes of the Forum are taken and communicated with the Society's Board of Directors. Past discussions have been lively, stimulating, and quite informative, due in large part to the Forum's unstructured, open-ended format.

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